PLAN FORMULATION

29. Jacksonville Harbor is in Duval County and at the mouth of the St. Johns River where it empties into the Atlantic Ocean. The harbor project provides access to deep draft vessel traffic using terminal facilities located in the City of Jacksonville. Those port facilities handle around 19 million tons of cargo a year based on statistics in recent years. That tonnage is sufficient to place the port among the top three cargo ports in the State of Florida. The city is the largest urban and business complex in northeast Florida and southeast Georgia.

EXISTING CONDITIONS

30. From the Atlantic Ocean inland to about Blount Island, there are tidal saltwater marshes on either side of the St. Johns River. The saltwater marshes on the north side of the river are more visible from the river because the south side in that reach has a higher land mass along the bank. That land supports trees and large shrubs as well as commercial and residential development along most of the shoreline. The marsh area behind that development receives tidal flows through the various creeks with openings into the St. Johns River. The primary development on the south side in that reach is at Mayport near the mouth of the river. Once past Mayport, the southern shoreline opens to a large expanse of marsh along the river west to the St. Johns Bluff area. Here the shoreline rises steeply on the south bank and residential development begins along the shore in the City of Jacksonville.

31. In the vicinity of Blount Island on the river, the old St. Johns River channel goes to the north of the island and a manmade cut is to the south of the island. The island itself was once a series of islands in the St. Johns River. The islands were connected using training walls along the river channel to contain the main body of water flow in that navigation channel. Dredged material from maintenance work to remove shoals went along the backside of the training walls and gradually filled the river bottom between the islands. The manmade cut along the south side of Blount Island, known as the Dames Point-Fulton Cut, removed three sharp turns in the river to enable larger

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[4] Colonel Joe R. Miller, District Engineer, Jacksonville District, Presentation to the 43rd Annual Meeting of the Florida Shore and Beach Preservation Association, September 2, 1999, Ft. Lauderdale, FL.

vessels in the world fleet to safely navigate the river. Material from that cut went into the Blount Island areas and into the formation of Bartram Island (formally known as Quarantine Island). Blount Island has since become a major port area for the City of Jacksonville.

32. West of Blount Island, the St. Johns River channel changes direction as it moves around the major metropolitan area of Jacksonville to the upstream limit of the deep draft navigation project. Most of the commercial development and deep draft terminals are in scattered locations on the north and west sides of the river. Most of the south and east sides of the river are residential areas and undeveloped lands such as Bartram Island.

TIDES AND CURRENTS

33. The St. Johns River is tidal up to and above Jacksonville. According to the National Oceanic and Atmospheric Administration[5], the mean range of tide decreases from 5.5 feet at the ocean to 4.5 feet at Mayport within a 2 mile distance. The jetties and the river topography effectively damp the signal as it progresses into the entrance. The following table summarizes the mean range of tide (mean high water - mean low water) at representative locations:

Table 2

Mean Tidal Ranges

Mile (Approx. distance from ocean entrance)	Location	Mean Range of Tide (feet)
2.2	Mayport	4.5
11.0	Dames Point	3.2
15.1	Navy Fuel Depot	2.6
23.2	Jacksonville, Acosta Bridge	1.5
Note: All values computed relative to the 1960-78 National Tidal Datum Epoch		

34. In the St. Johns River, the tidal current consists of saltwater flow interacting with freshwater discharge. According to the U.S. Geological Survey seawater moving upstream from the mouth of the St. Johns River mixes with the river water to form a zone of transition. The chemical character of the water in this zone varies from seawater near the coast to freshwater farther inland. Between the City of Jacksonville and the ocean, the river shows some vertical stratification between seawater and overlying river water. Daily maximum chloride concentrations in the river range from 2,000 mg/L at the Main Street Bridge to 19,000 mg/L at Mayport 50 percent of the days. At Drummond Point, about halfway between these two sites, daily maximum chloride

5 *Tide Tables 1997 High and Low Water Predictions, East Coast of North South America Including Greenland*, Issued 1996, National Oceanic and Atmospheric Administration, National Ocean Service, 241.

concentrations exceeded 10,000 mg/L about 50 percent of the days and 15,000 mg/L less than 7 percent of the days.[6]

35. Published Advice. According to the *United States Coast Pilot*, four areas of particular concern exist in the St. Johns River. Vessels should make every effort to avoid meeting at those areas. The first when proceeding from the sea is the Intracoastal Waterway (IWW) at about mile 5. The IWW is used extensively by tows and its junction with the St. Johns River is subject to strong and unpredictable crosscurrents at various stages of the tide. Repair docks on the north side, which may require speed reductions, further complicate the situation.

36. The second area is the Dames Point Turn at about mile 11. Navigation of this sharp turn is complicated by crosscurrents coming form the old channel behind Blount Island which tend to set a vessel deep into the bend on both the flood and ebb. In addition, the channel in this area is used as a turning basin for vessels using Blount Island terminal and the waterfront facilities in the old channel to the west of Blount Island.

37. The third area known as Trout River Cut at about mile 17 extends through rock formations. Deep loaded vessels must exercise great care not to leave the channel in this area. Local knowledge is necessary to predict current effects as they tend to set across the channel on both the flood and ebb. Poor handling vessels should use an assist tug when transiting the area of the Trout River Cut and Chaseville Turn to avoid being set on vessels transferring at the many oil terminals on the west bank of the river.

38. The fourth area or Commodore Point at about mile 22 consists of a nearly 90-degree turn complicated by the Hart Bridge with its piers in the turn and the Mathews Bridge just to the north. Poor handling vessels or those with questionable engines should use assist tugs to avoid being set on the support piers of either bridge.[7]

39. Currents. The currents are strong in the river as far upstream as Jacksonville. The velocity of the current between the jetties is 1.9 knots on the flood and 2.3 knots on the ebb. At downtown Jacksonville (Commodore Point), the velocity of current is about 1 knot. The winds have considerable effect on the water level and velocity of the currents. Strong northerly and northeasterly winds raise the water level about 2 feet at Jacksonville. Strong southerly and southwesterly winds lower the water level about 1 to 1.5 feet, increase the ebb, and decrease or interrupt the flood.[8]

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6 *Appraisal fo the Interconnection Between the St. Johns River and the Surficial Aquifer, East-Central Duval County, Florida*, U.S. Geological Survey, Water Resources Investigations Report 82-4109, Tallahassee, Florida, 1983, 5.

7 *United States Coast Pilot, Atlantic Coast: Cape Henry to Key West*, 1993 (29th) Edition, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, 153-154.

8 *United States Coast Pilot, Atlantic Coast: Cape Henry to Key West*, 1993 (29th) Edition, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, 153-155.

EXISTING TERMINAL FACILITIES

40. The primary concentration of port facilities on Jacksonville Harbor is between mile 8 and 23 of the Federal navigation project as shown in figure 2. Blount Island is a major port terminal area between mile 8 and 11. The Jacksonville Port Authority (JPA) terminal on Blount Island is 867 acres of container, cars, and bulk storage mostly on the western half of the island. The JPA is a major landowner for existing facilities in that area. From mile 11 to mile 13.5 along the northwest end of Dames Point, JPA started development of a new bulk cargo terminal known as the Ed Austin Terminal. The current site consists of 91 acres on a 565-acre site and first received bulk movements in 1995. From mile 14 to 19 there are several privately owned petroleum and bulk terminals scattered in that reach. In the mile 19 to 20 reach is the JPA Talleyrand Terminal which has about 173 acres for containerized and breakbulk cargo.

41. Blount Island. Located on figure 2, the Blount Island Marine Terminal is located approximately 11 miles west of and upriver from the Atlantic Ocean. The JPA terminal at Blount Island has about 6,630 feet of marginal wharf along the south and west sides. The port has eight container cranes including three with a 40-ton capacity, three with a 45-ton capacity, and two with a 50-ton capacity. The port in this location also has multiple units of container stacking equipment with 40 and 45-ton capacities. Transit shed warehousing on port property totals about 240,000 square feet. Open storage is about 566 acres. Railroad tracks connect the island with the mainland and extend to the marginal wharf and two transit sheds. State Road 105 and 9A connects the island to Interstate 95, 295, and 10.

42. General cargo, containers, and automobiles are the main traffic items at the Jacksonville Port Authority's Blount Island terminals. Berths 1, 2, and 3 handle containers traffic along the western end of the Dames Point-Fulton Cutoff channel. Five cranes serve those berths for the handling of containers. A multilevel automobile ramp is also on the western end of the island along the cutoff channel for unloading cars. Additional roll on-roll off (RORO) berths are on the west side of the island for unloading cars. A new auto dock on the west side of the island started operation in 1998.

43. JPA built the new multi-purpose/automobile dock on the terminal's west channel, along with a $4.8 million bridge over Blount Island's main entrance road, Dave Rawls Boulevard. This bridge allows vehicles using the new dock west of this road to move quickly to the newly-developed auto processing facility east of this road without impeding traffic entering or exiting the terminal.

44. JPA has completed construction on several major projects designed to improve handling and movement of cargo at Blount Island. The first group of these projects completed in 1998 included the construction of a modern 80,000-square foot vehicle processing facility. In late 1999, JPA opened 73,000-square feet of new facilities for Blount Island's second vehicle processor. The processors clean, inspect and add accessories to cars and trucks brought in by rail, truck or ship to the terminal before the vehicles are distributed to dealerships throughout the Southeastern United States.

Combined with vehicles moving through the Talleyrand Marine Terminal, vehicle processors at JPA handled more than 511,000 vehicles in fiscal year 1999. [9]

45. Jacksonville Electric Authority. At about the midpoint of Blount Island on the south side is the unloading facility for coal, which the Jacksonville Electric Authority (JEA) and the Jacksonville Port Authority (JPA) jointly own. That facility removes the coal form the ship to a covered conveyor that crosses the island and channel to a 500,000 ton storage area at the St. Johns River Power Park (SJRPP) near the river. SJRPP is a joint-venture between JEA and Florida Power and Light (FP&L). Each public utility receives 50 percent of the SJRPP's energy output. The unloading facility has a minimum rate of 750 tons per hour with an average of 1500 tons per hour. That plant can receive coal by water or rail.

46. Located adjacent and south of the coal-fired power plant JEA also operates the Northside Power Generating Plant. Currently the Northside Plant contains three power generating units. Units 1 and 3 usually average approximately 30 percent of their operational capacity. Unit 2 is currently idle. JEA plans to modify units 1 and 2 to burn petroleum coke by Spring 2002. Those modifications will allow units 1 and 2 to operate at capacity and burn approximately 1.6 million tons of petroleum coke per year. Unit 3 will continue as an intermediate type generator operating approximately 30 percent of the time on 206,000 tons of fuel oil annually. The facility will also use 535,000 tons of limestone as a desulfurization agent. All commodities will be received by vessel at the Northside Plant dock.

47. Ed Austin Terminal. The Ed Austin Terminal (JPA Bulk Terminal) is located about mile 13.4 on figure 2. The terminal handles bulk cargoes such as granite and limerock and currently contains about 91 acres on a 617-acre site. Operations started in 1995. Useable berthing space consists of about 1200 feet of fendered bulkhead adjacent to the Federal channel. This facility receives about 1.2 million tons of granite and limerock annually.

48. Talleyrand Terminal. The JPA terminal at Talleyrand is about mile 19 to 20 on figure 2. The terminal facilities handle containers, import cars, general cargo, and liquid bulk. General cargo includes steel, lumber, coffee, paper, and frozen goods. Tank storage is 8.1 million gallons. The tank farm has two stainless steel dock lines to accommodate food grade commodities. A the northern end of the terminal 840,000 tons a year of gypsum is currently imported and unloaded at a rate of 1,000 tons/hour.

49. To handle the ships and cargo, the Talleyrand Terminal has 4,800 feet of marginal wharf adjacent to 173 acres of paved, lighted, and secured space. The area has a refrigerated wharehouse with 120,000 square feet of space and a second with 40,000 square feet of refrigerated and dry cargo space. Along the marginal wharf there are six panamax container cranes; one 50-ton; two 45-ton; and three 40-ton capacity container cranes; a 100-ton multi-purpose gantry whirly crane; and two 50-ton rubber tired gantry cranes; and three 40-ton container stackers. Highway connections enable access to Interstate 95, 10, and 295. Three rail lines provide service with tracks into the area.

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9 Jacksonville Port Authority, JAXPORT Blount Island Marine Terminal, JAXPORT Marine Division, http://www.jaxport.com, 1998.

50. JPA Terminal Expansion. Total cargo tonnage for all three JPA terminals totaled about 7.5 million tons in FY 1999 and 7.1 million tons in FY 2000. Since 1990 tonnage for the marine terminals increased about 54 percent. Expansion of the three terminals continues. On the west side of the Blount Island terminal addition of the new auto dock is scheduled for completion in 1998. Other development on Blount Island includes 75 acres for an automobile processor, construction of an overpass and construction of an 80,000-square -foot auto processing building. The Ed Austin Terminal started handling bulk cargo in 1995 and plans exist to expand the 91 acre site. An additional 42 acres on the north end of the Talleyrand Terminal began development in 1997 to upgrade container operations.[10]

51. Petroleum Terminals. From mile 11 to 22 there are seven locations on figure 2 that handle petroleum products for 11 oil terminals. Each of those facilities has tank storage and access to the Interstate network of roads for overland delivery. Overall, the combined tank storage is about 5.2 million barrels. The JEA liquid fuel dock is located north of river mile 11 and the Navy Fuel Depot is at located at about river mile 16. Between river miles 13 and 15 three terminals have about 1.8 million barrels of tank storage and a throughput of about 1.3 million tons of petroleum products in 1993. Between river miles 17 and 18 two terminals have a combined tank storage of about 2.1 million barrels. Between river miles 18 and 19 north of the port authority's Talleyrand Terminal four terminals contain about 781,000 barrels of tank storage. Throughput at those terminals is about 680,000 tons a year of gasoline, diesel and fuel oils.

52. Dry Bulk Terminals. From mile 11 to 22 on figure 2 there are three terminals (excluding the Ed Austin and Talleyrand Terminals) that handle dry bulk material. They handle gypsum, phosphate and related products, steel products, and cement. The gypsum locations receive about 160,000 tons of gypsum a year by ship and 50,000 tons per year of gypsum byproduct from the nearby coal fired power plant. Self-unloading drybulk carriers can typically unload gypsum at a rate of 1,000 tons per hour onto a conveyor system which transports it to the 70,000 ton rock storage area. A phosphate facility at about river mile 18 can load dry non-acidic material at the rate of 3,000 tons per hour. To handle acidic bulk products, the system can unload a ship of super-phosphoric acid at the rate of 48 rail cars or 4,650 metric tons an hour. Storage facilities include six concrete silos each with a capacity of 4,000 tons and rubber lined tanks for acidic products. The Commodores Point Terminal at about river mile 22 handles cement in six bulk storage silos at the terminal. That terminal also has 154,800 square feet of warehousing and a total of 2,750 feet of wharf used for the berthing of cement bulk vessels and general cargo ships.

53. Container Terminal. Most of the container movements are through the Jacksonville Port Authority terminals at Blount Island and Talleyrand. The only other container operation is at a terminal for roll on-roll off (RORO) container barges and vessels about 20 miles from the mouth of the river on figure 2. The terminal area is about 65 acres with 3,000 feet of marginal wharf and 30,000 square feet of

10 Jacksonville Port Authority 2001-2002 Official Directory and Web Resource Guide. Fourteenth Edition. Jacksonville Port Authority, Jacksonville, Florida. Pages 10-14.

warehousing. The open storage area for the containers is 165 acres with paving, fencing, and lighting.

WATERBORNE COMMERCE

54. Jacksonville Harbor is the primary deep-draft port for waterborne commerce in northeast Florida. The closest major ports to Jacksonville Harbor are Savannah Harbor located about 125 statute miles to the north in Georgia, and Canaveral Harbor about 150 miles to the south in Florida.

55. Traffic. Both recreational and commercial use of the St. Johns River is heavy. As stated in records from the *Waterborne Commerce of the United States, Part 1,* the following table 3 shows inbound trips and outbound trips for commercial vessel movements on Jacksonville Harbor.

56. Various types of vessels move cargo on Jacksonville Harbor. The Jacksonville Port Authority reported 1,683 vessel movements in FY 1999. That movement is a large part of the total movement but not all as there are other private terminals not included in that estimate. Both the Blount Island and Talleyrand Terminals of the Jacksonville Port Authority handle car carriers, bulk ships and barges, and container ships. Car carriers bring automobiles from Japan to both Blount Island and Talleyrand on specialized vessel carriers or dual purpose RORO vehicle carriers, which rarely draft more than 30 feet. The container ships are mainly the lift-on lift-off (LOLO) type vessels that use the Port Authority terminals.

Table 3

Vessel Movements

YEAR	INBOUND TRIPS	OUTBOUND TRIPS
1999	6175	6276
1998	6219	6195
1997	5048	5069
1996	4963	4881
1995	4,809	4,810
1994	5,848	5,822
1993	6,071	6,088
1992	5,759	5,776
1991	4,840	4,833
1990	4,259	4,254
1989	4,417	4,340
1988	4,957	4,922
1987	4,624	4,545
1986	4,588	4,617
1985	4,549	4,540

57. The movements of gypsum, phosphate, and petroleum move on bulk vessels and tankers through private terminals. The bulk coal ships use a terminal on Blount Island operated by the Jacksonville Electric Authority which the Jacksonville Electric Authority (JEA) and the Jacksonville Port Authority (JPA) jointly own. The container terminal to the south of the Port Authority's Talleyrand Terminal handles RORO container barges and ships. Average transit drafts of the barges is not more than 15 feet. The ship drafts range from 29 to 31 feet. Those vessels serve Puerto Rico, South America, and other Caribbean ports.

58. In the vicinity of Blount Island there are various kinds of ship movements. Container vessels are mainly LOLO. Lancer class container vessels, using Blount Island, have a maximum draft of 32 feet and transport containers to and from Puerto Rico on a weekly basis. Atlantic class vessels transport empty containers into Jacksonville from Europe. Self-unloading dry bulk carriers in the 30,000 to 40,000 deadweight ton (DWT) range bring gypsum from Mexico to the terminal on the Blount Island West Channel. Bulk carriers of 20,000 DWT bring gypsum from Nova Scotia in 28-30 shipments a year.

59. Due to the constraining depth of Blount Island West Channel, residual fuel oil deliveries involve both ship and barge. The fuel arrives in 30,000 to 60,000 DWT tankers from Freeport in the Bahamas. Direct delivery to the terminal is rare and only with the smaller ships under restricted conditions. The vessels usually arrive and offload a portion of the fuel at a private terminal farther upriver before returning to the JEA terminal for delivery of the remaining fuel. The fuel, offloaded initially, is then loaded on a barge for delivery to the power plant. Larger ships may even light-load in order to get into Jacksonville Harbor.

60. Other deliveries of petroleum products involve tankers from St. Croix in the Virgin Islands and Corpus Christi, Texas. A 31,000 DWT tanker delivers oil derivatives from Texas to a terminal near the Broward River, while other oil products from St. Croix, which has a maximum allowable draft of 55 feet, arrive on 52,000 DWT ocean going barges to another private terminal near the same river. With the current Federal project depth of 38 feet some light-loading in addition to tidal delays occur with the ocean going barges. Additional tugs are also needed in shifting the vessels from one terminal to another.

61. The Navy Fuel Depot receives about 30 shipments a year on government owned tankers of about 28,000 DWT. The fuel comes primarily form Texas. Tankers in the 30,000 to 40,000 DWT range deliver most of the oil products to terminals just beyond the north end of the JPA Talleyrand Terminal. Tankers of about 60,000 DWT make the other deliveries involving from six to ten trips a year. Tidal delays sometimes occur with these vessels but no light-loading.

62. Commerce. Freight traffic through Jacksonville Harbor include the following commodities: gypsum, coal, petroleum products, automobiles, chemicals, crude materials, paper products, metals, food products, and machinery. Records from the Waterborne Commerce of the United States, Part 1, show the tonnages for the various

commodities moving through Jacksonville Harbor. Table 4 shows the total tonnage for the harbor over several years and table 5 has a breakdown of the major tonnage items from 1985 through 1999.

63. The primary type of cargo transiting Jacksonville Harbor is liquid bulk. As shown in table 5 petroleum and petroleum products represent the main category of tonnage using the harbor ranging from 5.5 to 10.7 million tons over the period of 1985 to 1999 with a high of 10.7 million tons in 1998. Major dry bulk includes coal increasing from 14 tons in 1985 to 1.4 million tons in 1999 with a high of 2.3 million tons in 1993. Gypsum included 437,000 tons in 1995 and limestone/granite 417,000 tons of other dry bulk materials in 1995. For FY 1999 the Jacksonville Port Authority reports 4.2 million tons of containerized cargo and 899,000 tons of vehicles (automobiles) and parts. JPA shows an increase in total cargo tonnage from FY 1995 of 5.7 million tons to 7.5 million tons in FY 99.

Table 4

Freight Traffic

YEAR	TONS
1999	19,257,000
1998	21,190,000
1997	18,186,000
1996	16,737,000
1995	15,693,000
1994	18,914,000
1993	18,905,000
1992	17,209,000
1991	16,364,000
1990	15,120,000
1989	15,185,000
1988	15,823,000
1987	13,497,000
1986	12,446,000
1985	11,332,000

Table 5

Waterborne Commerce

	AMOUNTS IN TONS			
YEAR	GYPSUM	COAL	PETROLEUM	VEHICLES
1999	483,000	1,361,000	9,880,000	827,000
1998	605,000	1,645,000	10,744,000	880,000
1997	929,000	1,332,000	8,794,000	648,000
1996	775,000	1,366,000	8,088,000	682,000
1995	437,000	1,342,000	7,277,000	565,000
1994	1,031,000	2,081,000	9,331,000	672,000
1993	789,000	2,254,000	10,017,000	630,000
1992	721,000	1,371,000	8,704,000	647,000
1991	834,000	1,829,000	7,410,000	564,000
1990	645,000	1,125,000	6,647,000	587,000
1989	920,000	811,000	6,680,000	583,000
1988	1,102,000	55,000	7,005,000	701,000
1987	909,000	137	5,916,000	802,000
1986	946,000	279	6,010,000	788,000
1985	981,000	14	5,531,000	705,000

BRIDGES

64. Within the Jacksonville Harbor area, six bridges cross the St. Johns River and two bridges cross the St. Johns River Old River Channel north of Blount Island. These bridges are described in the table 6 and located in figure 5 to mile 22.

PROSPECTIVE FUTURE CONDITIONS

65. An assessment into the future involves a review of past trends leading up to current situations and the likelihood of those conditions continuing into the future with or without change. Within the study area there are economic, environmental, and technical changes underway that will likely impact future conditions. Changing demands of the population will greatly influence those conditions.

66. Population. The Jacksonville metropolitan statistical area (JMSA)is probably a closer representation of the study area than just the City of Jacksonville. The JMSA includes the counties of Baker, Clay, Duval, Nassau, and St. Johns. The 1992 Florida Statistical Abstract lists the past populations for the JMSA in each census year since 1960. The overall population for that area has grown during that period as shown in Table 7. The University of Florida publication in July 1993 on population studies for the

State are the source of the 1970 and 1980 numbers. The numbers from 1990 to 2040 come from studies completed in 1992 by the Bureau of Economic Analysis in the U.S. Department of Commerce. A contrasting set of numbers, where available from the University of Florida studies, is also shown for the City of Jacksonville which is the largest of the five county area.

Table 6

Bridges Pertinent to the Jacksonville Harbor Navigation Project

Miles Above Mouth	Name/ Location	Type	Clearances (feet)		Purpose
			Horz	Vert	
	St. Johns River				
11.0	Dames Point	Fixed	906	160	highway
20.4	Mathews	Fixed			
	Terminal Channel		705	152	highway
	Arlington Channel		376	86	highway
22.0	Isaiah D. Hart	Fixed	960	141	highway
24.7	John T. Alsop	Vert/lift	350	40	highway
24.9	St. Elmo W. Acosta	Fixed	195	56	highway
24.9	Florida East Coast Railway	Bascule	195	5	railroad
	St. Johns River Old River Channel				
2.9	Seaboard Coastline Railroad	Fixed	19	8	railroad
3.0	Blount Island Channel Bridge	Fixed	63	10	highway

Table 7

Population
(1,000's)

Year	5 County	City of Jacksonville
1960		
1970	613	504
1980	722	541
1990	925	635
2000	1050	736
2010	1147	-
2020	1234	-
2040	1322	-

67. With an increasing population, area demands tend to grow as the population seeks to sustain or better its current standard of living. As the demand for products expands, the supply will likely grow to satisfy that demand. To support that demand, the port imports will likely be a part of that growth to serve the needs of the area. Whether a deeper depth on Jacksonville Harbor occurs is not likely to have significant impact one way or the other on the area population growth or demand.

68. Harbor Terminals. The Jacksonville Port Authority is already experiencing a demand for terminals to handle more cargo. In order to meet that demand, the Port Authority is actively pursuing development of terminals for existing and anticipated future demands. This development includes the relocation of existing terminals to make room for new terminals as well as the acquisition of lands and construction of landside facilities to accommodate more ships and cargoes. The port is looking at a phased development of newly acquired property on Dames Point and acquiring additional properties in all three areas of Talleyrand, Blount Island, and Dames Point. A market analysis for the port indicates substantial growth in containerized cargo to be a major force in future development.

69. The recommended port development alternative for Dames Point includes container, automobile, dry bulk, and break-bulk terminals. The existing Dames Point site has about 600 acres of developable property of which about 400 acres is suitable for marine terminal development. The container terminal is a RORO facility of about 40 acres. The automobile facility is to have two terminals of about 75 acres each. The break-bulk facility would handle two operators with about 10 acres each. A 10-acre auto rail yard is part of the alternative to serve the two automobile terminals. The dry bulk facility would be in an area roughly 30 acres. The recommended development alternative still leaves additional waterfront property for potential expansion.

70. The main focus on Blount Island is to be containers. The recommended development alternative is for relocating existing facilities from Blount Island to accommodate two major container carriers. The relocations would include one automobile terminal operator, a dry bulk operator, and a RORO container operator to the Dames Point terminal area. The Jacksonville Port Authority also has the option to develop a 112-acre area on Blount Island.

71. The alternative for development of the Talleyrand area involves the acquisition of lands owned by a major container carrier operation. That carrier is adjacent to property which the Port Authority already owns. This would allow the Port Authority to consolidate the existing operations to more efficiently utilize the area.

72. Harbor Traffic. With no change in the existing harbor depth, the anticipated vessel traffic would increase. Usage of the existing harbor channel would become more congested as the harbor pilots can only pass in certain reaches of the harbor. The traffic is likely to be a mixture of various size vessels with the preponderance of those being the smaller ocean carriers. With a deeper channel in the harbor, the larger deep draft ships could operate more efficiently with larger cargo loads resulting in fewer trips to the port. As cargo tonnage through the port increases in the future, the traffic in the harbor would increase. The amount of increase would be based on the size vessels carrying the cargo and the depth of the channel for those vessels to handle the cargo. Fleet composition and projections for ships carrying coal, limestone/granite, petroleum-coke, liquid petroleum products, and containers are contained in the benefits appendix D (For Official Use Only) of the September 1998 Final Feasibility Report and EIS. For this report fleet appendix D provides composition and projections for ships servicing the petroleum, dry bulk, and container terminals between miles 14.7 and 20.

73. Harbor Tonnage. The Jacksonville Harbor Federal project channel serves both private and public terminals. Most of the liquid and dry bulk terminals are in private ownership. The Jacksonville Port Authority operates the public terminals that handle bulk, breakbulk cargoes, containers, and automobiles. For FY 2000 containerized cargo accounts for over 53 percent (3,797,000 out of 7,114,000 tons) of the Jacksonville Port Authority total cargo traffic.[11] Other major cargo movements on the Federal channel include vehicle imports along with bulk movements of coal, gypsum, limestone, granite, petroleum-coke and liquid petroleum products.

74. For the segment under consideration, river miles 14.7 to 18.2, the economic analysis in appendix D discusses the various movements and provides a projection of tonnage based on available data. Only the tonnage for which there was a projected benefit has a projected amount. Future tonnages with and without project for liquid petroleum and liquified petroleum gas (propane) products are included over the anticipated project life of 2004-2054.

75. Bartram Island Environmental Conditions. Bartram (Quarantine) Island appears on survey maps of the Jacksonville Harbor area as early as 1895 apparently as a result of dredged material placement. Placement of dredged material in subsequent years

11 Jacksonville Port Authority 2001-2002 Official Directory and Web Resource Guide. Fourteenth Edition. Jacksonville Port Authority, Jacksonville, Florida. Page 10.

behind the Dames Point Training Wall extended Bartram Island to the configuration shown on figure 1. As a result of its continued use for dredged material placement, Bartram Island has been heavily impacted. Some of the island's original vegetative cover remains, mainly in the form of fringing smooth cordgrass, along with black needle rush, glasswort, saltwort salt grass salt marsh bulrush, sea ox-eye, groundsel and marsh elder. Much of the island is typified, however, by early successional plants as a result of disposal activities. A shallow open-water impoundment created by disposal activities occupies the far western section of the island. The section east of the Dames Point Bridge also has several wet depressions supporting willow and wax myrtle. Grasses and other herbaceous vegetation occurs on the dike slopes. Other vegetation occurring sparsely on the island includes black cherry, sumac, southern red cedar, slash and longleaf pine, oaks and cabbage palm. The mosaic of various successional species is of benefit to resident and migratory birds, including roosting herons and egrets. Although no wading birds rookeries were observed, a number of least terns were observed on bare sand within the large diked area east of the Dames Point Bridge, by FWS personnel during their June 1996 visit, which could be an indication of nesting activity. The salt marsh and shallow water impoundment support fish, reptiles, including the diamond-back terrapin, many species of shore and wading birds, and marsh specialists such as the marsh wren and clapper rail.

76. With or without the proposed deepening of segment 3A between river miles 14.7 and 20, figure 2, Bartram Island will continue to receive placement of dredge material not suitable for construction fill or beach placement in the existing confined disposal facilities on the east and west ends of the island. Authorization of the 40-foot project from the entrance channel to river mile 14.7, figure 1, in the Water Resources Development Act (WRDA) of 1999 included raising the existing dikes of one segment of the confined disposal area on the east end of Bartram Island. The Jacksonville Port Authority (JPA) recently raised the dikes on the west confined disposal facility (CDF) 10 feet to an elevation of 28.5 feet in August 1999. That modification provided an additional 6.5 million cubic yards of capacity for the upland confined disposal facility on the west end of Bartram Island.

77. With or without the proposed deepening of segment 3A the District Migratory Bird Protection Policy will continue to require bird monitoring of the disposal facility. Recent monitoring during the raising of the dikes on the west (CDF) indicated low levels of bird activity and nesting success due to the presence of predators. Frequent use of Bartram Island for placement of dredge material and predators including wild hogs and raccoons indicate this area will not be subject to windows for bird nesting.

PROBLEM IDENTIFICATION

78. Many of the vessels that currently use Jacksonville Harbor must light-load or wait on tidal advantage in order to enter or leave the harbor causing increased transportation costs. The current 38-foot project depth of Jacksonville Harbor from mile 14.7 to mile 20 also impacts the introduction of larger vessels into the fleet that would visit the harbor. The loss of those larger vessels results in a loss of transportation efficiencies to the port. In April 2002 a contract award occurred for deepening the main channel from a project depth of 38 feet to 40 feet from the entrance channel to river

mile 14.7 as a result of the WRDA 1999 authorization. Accordingly, the without project condition for the main channel consists of a 40-foot project depth from the entrance channel at river mile 0 to 14.7 and a 38-foot project depth from mile 14.7 to 20.

WITHOUT PROJECT CONDITION

79. Draft Restrictions. The present authorized channel between miles 14.7 and 20 is maintained at 38 feet mean low water (MLW). Channel widths vary from 400 to 660 feet. Two-way traffic is permitted in most of the reaches but is restricted in some of the narrower reaches during peak tidal currents with some of the larger vessels. Outbound and inbound traffic is restricted to a maximum 34-foot draft and vessel length of less than 700 feet during peak ebb tides.

80. According to the St. Johns Bar Pilot Association vessels with lengths of 700 feet or more drafting between 32 and 34 feet must use a tug escort with a vessel docked at ST Services during ebb tide. Vessels with drafts greater than 34 feet cannot transit outbound during the ebb tide with or without a vessel docked at ST Services.

81. Difficult Currents. The *United States Coast Pilot* warns deep draft ships of the Trout River Cut at about mile 17. It states that deep-loaded vessels must exercise great care not to leave the channel in this area. Local knowledge is necessary to predict current effects, as they tend to set across the channel on both the flood and ebb. Poor handling vessels should use an assist tug when transiting the area of the Trout River Cut and Chaseville Turn (figures 3 and 7) to avoid being set on vessels transferring at the many oil terminals on the west bank of the river. One harbor pilot noted that an outbound container ship demolished the Shell Oil dock opposite buoy 71 years ago in clear weather. Also a poor handling outbound container ship collided with a tanker at Steuart Oil Terminal in the 1970s after turning buoy 71. Currently ST Services owns both Shell and Steuart Oil Terminals.

82. Bank Suction Effects. The Jacksonville Port Authority (JPA) noted in a letter dated March 30, 2001, that one of their major container carriers refuses to bring larger ships into Jacksonville as long as navigation restrictions exist in the area of the Chaseville Turn or about river miles 17 – 18. JPA explains that navigating the Chaseville Turn outbound on an ebb current requires extreme rudder positions and power demands on the ship. A ship at the ST Services dock presents unusual circumstances that require effective rudder response from the passing ship. Effective rudder response requires a certain speed, but due to the proximity of the moored ship to the channel, the passing vessel cannot exceed six knots or risk a bank suction force that would break the docked ship from its moorings. That situation again places restrictions on the less maneuverable and deeper draft ships, which by the nature of the channel have limited options to maintain a safe distance from a tanker docked at ST Services.

PLANNING OBJECTIVES AND CONSTRAINTS

83. The Federal objective, required in water and land resource planning, is to make a contribution toward National Economic Development (NED) consistent with protecting

the nation's environment. Planning objectives of this study involved the use of available information to evaluate improvements for Jacksonville Harbor to efficiently and safely accommodate larger vessels while preserving environmental and cultural resources impacted by navigation improvements.

PLANNING OBJECTIVES

84. Planning objectives relate directly to the previously mentioned problems and opportunities and guide the formulation and evaluation of plans. Specific planning objectives for the General Reevaluation Report for Jacksonville Harbor were to:

- Determine if sufficient light loading, tidal delay, or other commercial navigation benefits exist to deepen river miles 14.7 through mile 20 of the Federal channel from an existing project depth of 38 feet to the 40-foot depth currently authorized and under construction from the entrance channel to mile 14.7 of the main channel;

- Examine measures which would reduce or redirect the impact of difficult flood and ebb currents in the area of the Chaseville Turn and ST Services Terminal;

- Evaluate measures which would allow the St. Johns Bar Pilots and the Captain of the Port to remove restrictions requiring a tug escort on ships with lengths of 700 feet or more drafting between 32 and 34 feet with a vessel docked at ST Services during the ebb tide;

- Examine measures to reduce the bank suction or surge effect from passing ships that tends to break a docked ship from its moorings at the ST Services Terminal in the Chaseville Turn;

- Determine if proposed measures meet the needs of future commercial ship navigation requirements;

- Identify environmental and cultural resources in the study area and potential impacts from deepening or widening to those resources;

- Review the impact of proposed measures on the existing harbor maintenance and future dredged material management plans; and

- Identify the NED plan for Jacksonville Harbor which most efficiently and safely accommodates existing and larger vessels while preserving environmental and cultural resources.

PLANNING CONSTRAINTS

85. Constraints are restrictions that limit the planning process. Constraints could include resources, legal, or policy constraints. Resource constraints are usually associated with limits on knowledge, expertise, experience, ability, data, information, money, and time. Legal and policy constraints include those defined by law, Corps policy and guidance. Plan formulation involves meeting the study objectives while not violating the constraints. Specific study constraints include:

- Limits on evaluation of Federal channel depths to 39 and 40-foot project depths for river miles 14.7 to 20, since the maximum project depth for river miles 0 to 14.7, currently under construction, is 40 feet based on a Water Resources Development Act of 1999 authorization;

- Blasting as a construction method of removing rock from the prior 38-foot project deepening of river miles 14.7 to 20 in the 1970s did not receive public support; and

- The St. Johns Bar Pilot Association and the Captain of the Port require ships with lengths of 700 feet or more drafting between 32 and 34 feet to use a tug escort with a vessel docked at ST Services during the ebb tide.

86. The formulation and analysis of alternative plans to achieve planning objectives were based on Water Resources Council's Principles and Guidelines, the National Environmental Policy Act of 1969, and related Corps regulations. Those guidelines provide for developing alternative resource management systems that address planning objectives.

ALTERNATIVE PLAN CONSIDERATIONS

87. The 1998 feasibility study and subsequent WRDA 1999 authorization resulted in approval for deepening the main ship channel (segments 1 and 2 of figure 2) from an existing project depth of 38 feet to an authorized project depth of 40 feet. That authorization also included deepening the West Blount Island Channel (segment 4 of figure 2) from a project depth of 30 to 38 feet. Construction of segment 4 completed in April 2002. While segment 3A of figure 2 received consideration in the September 1998 feasibility study, sufficient benefits did not exist for deepening at that time. Since that time conditions have changed concerning petroleum bulk movements and container traffic in that segment as well as changes in ownership and expansion of petroleum terminals. A reevaluation of benefits based on new information provided the impetus for this review.

88. For this General Reevaluation Report (GRR) Segment 3A was divided into two smaller segments called 3A1 and 3A2. Segment 3A1 extends from mile 14.7 to mile 18.2, while 3A2 extends from mile 18.2 to mile 20 as shown in figure 2.

89. As a result of the WRDA 1999 authorization the without project condition for Jacksonville Harbor provides a main channel project depth of 40 feet from the junction with the U.S. Navy military channel at mile 0 near the jetties to mile 14.7 and a 38-foot main channel project depth from mile 14.7 to 20 at Talleyrand Terminal in Jacksonville. There are no major commercial ship terminals within the first 9 to 10 miles of that channel from the military channel west along the waterway. The only deep draft terminal in that reach is the U.S. Naval Station at Mayport. That station has a military channel with a depth of 42 feet from the ocean to the Navy Basin just inside the jetties. From the junction with the navy channel, the commercial civil works channel has an authorized depth of 40 feet for 1 mile east along the military channel then a depth of 42

feet that extends along the military channel to the 42-foot depth contour in the ocean. Both the military and non-military vessels use the same channel from the ocean to the 40-foot civil works channel existing on the Jacksonville Harbor project.

90. U.S. Navy Plans. During the 1998 feasibility study the U.S. Navy expressed interested in the studies and plans to deepen Jacksonville Harbor. The reason for that interest relates to Navy considerations of Mayport Naval Station as a potential home port for a nuclear aircraft carrier. That carrier would require a channel with a depth of about 50 feet. Coordination with the Navy indicates that deepening would occur after further deepening is done on the civil works project. Deepening of the Jacksonville harbor project first from the ocean through the jetties would lessen the Navy's cost for deepening in that reach but would not enable the operation of the nuclear carrier unless a depth of 50 feet or greater is possible.

91. The 1998 feasibility study resulted in authorization of a 40-foot project from the entrance channel to river mile 14.7. Since the WRDA 1999 authorized 40-foot project depth precedes the current study area limits of river miles 14.7 to 20, no additional depth for non-military vessels will receive consideration during this study. Should future feasibility study findings indicate deepening the existing civil works project for Jacksonville Harbor is favorable, a report will go forward to Congress for authorization. Once authorization and construction funding are available, the possibility exists for the Navy work to be done at the same time as the civil works project. The Navy would incur the cost for deepening the channel below the authorized depth for the civil works project.

Non-Structural Alternatives

92. Alternative - No Action. If there is no action to deepen river miles 14.7 through 20 of Jacksonville Harbor, the most probable future conditions consist of the harbor continuing operation under the current conditions. The existing fleet of ships currently visiting the harbor would continue, but with less of an increase in cargo carrying capacity due to continued light loading and tide delays associated with the 38-foot depth of the main channel from river mile 14.7 through 20. Port plans for development of the Talleyrand Terminal would not go forward as quickly for the handling of future increased cargoes associated with transportation efficiencies of a deeper channel. The number of ship transits in the harbor is likely to increase, since ships have to make additional trips to provide the required petroleum products and containerized cargo since loading deeper would not be an option. Higher levels of congestion and problems would result. Under those conditions there is likely to be longer and more frequent delays in moving vessels in and out of the harbor past the Chaseville Turn.

93. Tug Assistance in place of Widening. Non-structural measures, such as the use of tugs in place of the proposed Chaseville Turn Widener, received consideration, but were not analyzed because of information provided by the St. Johns Bar Pilot Association. Tug assistance in place of widening for vessels with drafts greater than 34 feet would not help the current situation as those vessels displace too much water even at reduced speeds to transit safely past a docked tanker at ST Services during the ebb current with the current channel configuration. The displacement of that size ship results in a suction effect, that places increased tension on the mooring lines of a

docked tanker, which could pull it away from the oil terminal at ST Services. For an example of a suction effect see the St. Johns Bar Pilot video at:

ftp://ftp.saj.usace.army.mil/pub/uploads/Tom%20Smith/JaxHarbor/SurgeDemo.mpg

The proposed additional channel width of the Chaseville Turn widener would provide sufficient clearance to mitigate the suction effect and remove the transit restriction as indicted in the St. Johns Bar Pilot Association letter dated June 14, 2001 and included in the correspondence section of the Environmental Assessment. Using tugs would not change the degree of risk created by a combination of the current channel configuration, a discharging oil tanker, strong ebb currents affecting steering control, and the suction caused by the displacement of the deep draft vessel.

Structural Alternatives

94. Alternative Channel Reaches for Deepening. For the September 1998 feasibility study, in deciding what alternatives to consider for deepening, the location and identification of the various terminals were necessary along the river. The somewhat clustered location of terminal facilities provided the basis for selecting four channel segments on the Jacksonville Harbor project to consider as shown in figure 2. Three of those channel segments were on the main ship channel extending from the ocean past Blount Island to the Mathews Bridge. Identification of the four segments follows:

- Segment 1 - Atlantic Ocean to Mile 11
- Segment 2 - Mile 11 to Mile 14.7
- Segment 3A - Mile 14.7 to Mile 20
- Segment 3B - Mile 20 to Mile 21.7
- Segment 4 - West Blount Island Channel

The fourth segment is the channel on the west side of Blount Island. Each of those segments underwent an economic and environmental analysis to determine the justification for deepening during the 1998 feasibility study. Depths of consideration in each segment were at one foot increments from 40 feet to 45 feet.

95. For this General Reevaluation Report (GRR) Segment 3A was broken down into two smaller segments called 3A1 and 3A2. Segment 3A1 extends from mile 14.7 to mile 18.2, while 3A2 extends from mile 18.2 to mile 20 as shown in figure 2. While segment 3A received consideration in the September 1998 feasibility study, sufficient benefits did not exist for deepening at that time. Since that time conditions have changed concerning petroleum bulk movements and container ship traffic in that segment as well as changes in ownership and expansion of petroleum and container terminals. A reevaluation of benefits based on new information provided the impetus for this review.

96. Channel Widening. Except for two areas, the Chaseville Turn near ST Services and Training Wall Reach (figure 3) at the intersection of the IWW with the St. Johns River, current ship movements on Jacksonville Harbor appear to have an acceptable width. Future vessels are not expected to be significantly larger than those in the

existing fleet. Chaseville Turn and Training Wall Reach include areas where the harbor pilots, port authority representatives, and ship operators would like some additional width. The area the harbor pilots requested most for widening is between miles 17 and 18 of figure 2 or the Chaseville Turn. Whether problems in those areas need extra channel width or an adjustment in channel alignment became part of the evaluation involving the ship simulation study. Further iterations of the planning process resulted in comparisons of costs and benefits for the deepening plans with widening options. The plans with widening contained high costs due to rock excavation requirements. Sufficient benefits did not exist during the 1998 feasibility study to justify deepening or widening between miles 17 and 18.

ALTERNATIVE EVALUATIONS

97. The September 1998 feasibility plan considerations identified alternatives for evaluation. Those plans (A, B, and C) included the deepening, narrowing, and widening of several segments of the existing harbor channel. Those segments, identified as 1 through 3 on the main ship channel and segment 4 on the West Blount Island Channel (figure 2), provided the basis for evaluating deepening to depths of 40-45 feet. The evaluation involved information from topographic and bathymetric surveys, and subsurface investigations to obtain quantity estimates on material to be dredged with deepening. Ship simulation, hydrodynamic and sediment transport modeling studies allowed evaluation of plans for impacts to ship handling and sedimentation. Sediment sampling for water quality evaluation of dredged material, submerged historic properties surveys, and cultural resource assessment of proposed dredged material areas provided coordination of plans with environmental and technical agencies to assess impacts of deepening. An economic analysis took into account the transportation benefits from deeper channel depths and the cost of dredging those depths to include the disposal of material.

INITIAL ALTERNATIVES

98. During the 1998 feasibility study discussions with study team members including the sponsor, St. Johns Bar Pilots, and WES representatives resulted in development of two initial alternatives, plans A and B. Plan A involved narrowing the existing 38-foot channel width while plan B widened it.

99. Plan A. Plan A narrowed the channel within the bottom width limits of the existing 38-foot channel alignment. Plan A used the existing channel alignment and resulted in a reduced main channel bottom width. That bottom width reduction decreased the excavation quantities by reducing the impact of the side-slope dredging template. Plan A moved the sides of main channel further away from the shoreline and reduced the potential impact on shoreline erosion. Proposed bottom width changes in comparison to the existing main channel varied from a reduction of 25 to 250 feet depending on the location. Plan A was developed to respond to the shoreline erosion concerns.

100. Plan B. Plan B kept the existing main channel alignment and added wideners in locations suggested by the St. Johns Bar Pilots. Most areas widened from an existing width of 500 feet to 575 feet. The following sections of the existing Federal channel contained proposed wideners:

- Miles 5 to 6 (Training Wall Reach) channel widener on south side
- Miles 6.7 to 8.2 (White Shells Cut Range & St. Johns Bluff Reach) Channel shifted to the north
- Miles 8.2 to 10.5 (Dames Point-Fulton Cutoff Range) channel widener on north side
- Miles 12.5 to 13.3 (Brills Cut Range) channel widener on south side
- Miles 14.7 to 16 (Drummond Creek Range) channel widener on south side
- Miles 16.3 to 17.3 (Trout River Cut Range) channel wideners on east and west sides
- Miles 17.3 to 17.8 (Chaseville Turn) channel widener on east side

101. For the September 1998 feasibility study plans A and B became the initial plans used for testing in the Ship Simulator at the Waterways Experiment Station in Vicksburg, Mississippi. Plan C resulted from ship simulation tests of those two plans.

SHIP SIMULATION TESTING OF ALTERNATIVE PLANS

102. The supplemental report section and engineering appendix A of the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement* contains a detailed evaluation of the ship simulation testing of plans A, B, and C. Saint Johns Bar Pilot Association and Jacksonville Docking Masters Association representatives worked with District and Waterways Experiment Station (WES) personnel to test the alternative plans. Initial testing of Plans A and B resulted in development of plan C which combined elements of plan A that narrowed the existing 38-foot deep channel with parts of plan B which widened it. Since alternative depths of 40-45 feet were under consideration for deepening, a depth of 42 feet was chosen for ship simulation testing. That depth represents a midpoint for results from the ship simulation testing which are valid for a range of two feet above or below the test depth of 42 feet. Ship simulation testing results are valid for depths of 40 to 44 feet.

103. Plan C. Testing of plans A and B described above resulted in development of plan C. Plan C onsists of the following features combined from plans A and B:

- plan A width from the ocean to about mile 4.6;
- Miles 5 to 6 (Training Wall Reach) plan B channel widener on south side;
- Miles 6 to 6.7 (Short Cut Turn) plan A width;
- Miles 6.7 to 8.2 (White Shells Cut Range & St. Johns Bluff Reach) plan B channel shift to the north (figures 10 & 11);
- Miles 8.2 to 10.5 (Dames Point-Fulton Cutoff Range) plan B channel widener on north side (figures 10 & 12);
- Miles 10.5 to 12.5 (Dames Point Turn & Quarantine 1, Upper Range) plan A channel width;
- Miles 12.5 to 13.3 (Brills Cut Range) plan A channel width;
- Miles 13.3 to 16.2 (Broward Point Turn to Drummond Creek Range) plan A channel width;

- Miles 16.3 to 17.3 (Trout River Cut Range) plan B channel wideners on east and west sides;
- Miles 17.3 to 17.8 (Chaseville Turn) plan A channel width;
- Miles 17.8 to 18.7 (Long Branch Range) plan A channel width;
- Miles 18.7 to 19.5 (Terminal Channel) plan A channel width with turning basin added (figures 10 & 13); and
- Miles 19.5 to 21.3 (Terminal Channel) plan A channel width.

Plan C also contained a flow improvement channel for Mill Cove. That feature was removed after a separate authorization was received in planning guidance correspondence mentioned below.

MILL COVE FLOW IMPROVEMENTS

104. Plan C originally contained a flow improvement channel described in the *WES Ship Simulation Study* and the *Hydrodynamic and Sediment Transport, Mill Cove, St. Johns River Study* in the supplemental report section of the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement*. Engineering appendix A of that report contains design information on the flow improvement channel. The 6-foot deep by 80-foot wide channel extends from the existing weir and diversion feature at the eastern end of Bartram Island through Mill Cove (figure 3) to the opening between a second diversion feature ("No-name" island) at the west end of Mill Cove and the shore. The purpose of the channel is to improve the flow of water through Mill Cove to decrease sediment accumulating in the area.

105. The hydrodynamic and sediment transport study for Mill Cove tested four different plan C configurations for the Bartram Island disposal area (north shoreline of Mill Cove) and a fifth with a change in the bathymetry. The fifth alternative contained the 6-foot deep by 80-foot wide flow improvement channel.

106. After receipt of CECW-PE and CESAD-ET-PL memorandums on the implementation of Section 317 of the Water Resources Development Act of 1996 (WRDA 96) - Jacksonville Harbor (Mill Cove), Florida, shown in the pertinent correspondence appendix C, the improvement feature was removed from plan C. That guidance directs the Secretary to carry out a project for mitigation, consisting of measures for flow and circulation improvement within Mill Cove, at an estimated total Federal cost of $2,000,000.[12] No work can occur until funds are appropriated for that purpose.[13] The St. Johns Water Management District, the sponsor, has provided 100 percent of the required funds. Award of a construction contract occurred on 25 Oct 01 for $1.89 Million. Construction completed in fiscal year 2002.

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[12] Public Law 104-303, October 12, 1996. Section 317. Jacksonville Harbor (Mill Cove), Florida.

[13] CECW-PE MEMORANDUM FOR Commander, South Atlantic Division, ATTN: CESAD-ET-PL. SUBJECT: Implementation of Section 317 of Water Resources Development Act of 1996 (WRDA 96) - Jacksonville Harbor (Mill Cove), Florida.

GEOTECHNICAL INVESTIGATIONS

107. During the 1998 feasibility study plan C involved widening in areas not previously blasted from construction of the current 38-foot project depth, analysis of core boring information in the "rock hardness" section of the 1998 appendix A indicates that blasting would be required for plan C. A comparison of plan C costs to available benefits did not result in a justifiable plan C alternative. To reduce the 1998 study costs, modifications to plan A followed.

108. For this General Reevaluation Report (GRR) the blasting requirements section of appendix A indicates the required dredging grades can be achieved without blasting. A review of existing and additional after dredge surveys and core borings from Cut 50, Station 4+00 to Terminal Channel, Station 65+00 or Segment 3A (3A1 + 3A2) provided information indicating that conventional dredging equipment can achieve the required grades without blasting.

PLAN A , 3A1, and 3A2 MODIFICATIONS

109. During the 1998 feasibility study the analysis of plan A to reduce costs developed into three modifications based on construction methods and location of disposal areas. Plan A1 involved blasting, plan A2 required no blasting, and plan A3 (figure 1) contained an additional channel width reduction to avoid as much rock as possible and use of a clamshell dredge for excavation. Further evaluation of plan A1 and A2 costs with available benefits resulted in removal of those two plans from consideration and returned the focus of investigations to plan A3.

FINAL ALTERNATIVES

110. For this GRR the reduced channel width of plan A3 represented the plan initially evaluated for further consideration from mile 14.7 to mile 20. Subsequent evaluations of geotechnical information, the most recent hydrographic surveys, along with costs and benefits allowed assessment of the full existing channel width for segments or plans 3A1 and 3A2 (figure 2) instead of the narrowed width of plan A3 (figure 1).

111. While segment 3A of figure 2 received consideration in the September 1998 feasibility study, sufficient benefits did not exist for deepening at that time. Since that time conditions have changed concerning petroleum bulk movements and container traffic in that segment as well as changes in ownership and expansion of petroleum and container ship terminals. A reevaluation of benefits based on new information provided the impetus for this review.

112. Initially a letter from the one of the oil terminal operators in segment 3A, figure 2, noting a change in ownership and acquisition of an adjacent oil terminal, recommended reevaluation of potential benefits relating to their facility. The Sponsor reviewed the assessment of changed conditions and requested the Corps to reevaluate the potential for deepening within the section of the main ship channel designated as segment 3A1 of figure 2.

113. During the process of that reevaluation the Sponsor notified the Corps of a change in operations at their Talleyrand Terminal. An existing container ship operator acquired a similar Talleyrand Terminal tenant to expand their current operations at the JPA. That container ship company has added larger ships to its current operation with the idea of making Jacksonville a load center. That company with its consortium partners will select a southeastern port for consolidation of its South American service. According to company officials the Talleyrand Terminal at Jacksonville is a strong candidate because of on-site rail connections. In a letter to the Corps, dated December 12, 2000, the Sponsor requested reconsideration of potential deepening of the main ship channel to their Talleyrand Terminal along with segment 3A1. Segment 3A2 of figure 2 contains the JPA Talleyrand Docks and Terminal.

114. Authorization of the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement* resulted in a 40-foot project depth from the entrance channel to about mile 14.7. Since that depth constrains the remainder of the main channel (river miles 14.7 – 20), only project depths of 39 or 40 feet could receive further consideration. Segments or plans 3A1 and 3A2 consist of the following proposed navigation features.

Plan 3A1. Plan 3A1 extends from about river mile 14.7 to 18 or Cuts 50 - 54 with:

- a project depth of 39 or 40 feet plus 2 feet required and 2 feet of allowable overdepth;
- over the existing channel width;
- includes a widener at the Chaseville Turn shown in figures 3 and 4; and
- upland confined disposal area (DA/Q1) on the west end of Bartram Island.

Plan 3A2. Plan 3A2 extends from about river mile 18 to 20 or Cuts 55 - Terminal Channel Station 65+00 with:

- a project depth of 39 or 40 feet plus 2 feet required and 2 feet of allowable overdepth;
- over the existing channel width; and
- includes a turning basin as shown in figures 3 and 4.
- upland confined disposal area (DA/Q1) on the west end of Bartram Island.

QUANTITY ESTIMATES

115. The evaluation to determine quantity estimates involved the use of recent bathymetric surveys as shown in the engineering appendix A. The estimates of the excavation in cubic yards to deepen the incremental channel segments (segments 3A1 and 3A2) are in table 8 by the different project depths. To determine the amount of rock in the estimates, existing and new core boring information was analyzed. The quantities in that table represent initial construction of segments 3A1 and 3A2. After-dredge surveys (number 00-250, 00-273, 00277, and 01-021) provided the most recent hydrographic surveys for computation of volumes. Appendix A contains a more detail breakdown of the rock and non-rock quantities by cut and station. Table 8 shows total quantities by cut as referenced from the MCACES estimate of appendix A. Project depths shown include a 2-foot required and 2-foot allowable overdepth. See figures 7 and 8.

Table 8 Plan 3A1 & 3A2 Initial Construction Excavation Quantities in Cubic Yards Reference: MCACES estimate Table A-1 of Engineering Appendix A			
	Alternative Depths		
Segment	**38-Foot Proj**	**39-Foot Proj**	**40-Foot Proj**
3A1	**38'+2'+2'=42'**	**39'+2'+2'=43'**	**40'+2'+2'=44'**
Cut-50	0	196,646	320,986
Cut-51	0	60,160	126,919
Cut-52	0	35,222	59,066
Cut-51/52 Widener	238,269	264,309	290,951
Cut-53	0	57,442	89,333
Cut-54	0	55,662	83,932
Subtotal	238,269	669,441	971,187
ST Services Berth	0	2,559	5,119
U.S. Navy Berth	0	21,545	43,090
Subtotal 3A1	238,269	693,545	1,019,396
Segment	**38-Foot Proj**	**39-Foot Proj**	**40-Foot Proj**
3A2	**38'+2'+2'=42'**	**39'+2'+2'=43'**	**40'+2'+2'=44'**
Cut-55	0	137,906	256,294
Cut-TC	0	184,865	305,236
TC Turning Basin	417,604	496,531	580,806
Subtotal	417,604	819,302	1,142,336
JPA Talleyrand Berth	0	18,981	37,963
Talleyrd Toyota Berth	0	3,241	6,481
Chevron Oil Berth	0	35,396	39,445
Subtotal 3A2	417,604	876,920	1,226,225
Subtotal 3A1 + 3A2	655,873	1,570,465	2,245,621
- Toyota Berth			-6,481
- TC Turning Basin			-580,806
Total 3A1 + 3A2			**1,658,334**

DISPOSAL AREA CONSIDERATIONS

116. A disposal area study in 1989 considered about 76 sites. The study results indicated 10 inland sites had potential to hold dredged material from the upper reaches of the harbor project. Beach and offshore disposal are the most efficient means of disposal for non-rock material dredged in the ocean and river areas close to the shoreline.

117. In the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement* nine of

those inland disposal areas received consideration for plan C and are discussed in the Environmental Impact Statement (EIS) section of that report (printed on green paper). Two of those areas are Bartram Island (formerly known as Quarantine Island) and Buck Island on the south side of the river at about mile 6. The remaining plan C potential upland disposal areas are located north and northwest of Blount Island and Dames Point.

118. For this General Reevalualtion Report the west end of Bartram Island will receive all the material from segments 3A1 (Cuts 50 – 54) and 3A2 (Cut-55 – Terminal Channel, Station 65+00). The Jacksonville Port Authority raised dikes an additional 10 feet on the west end of Bartram Island in 1998 to increase capacity by five million cubic yards.

ENVIRONMENTAL CONSIDERATIONS

119. Environmental studies investigated existing conditions with regard to the channel area dredging and the potential sites for the disposal of dredged material. Details on the environmental investigations are in the EIS of the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement*. A copy of that EIS and USFWS CAR is available on the Jacksonville District Web Site at:

http://www.saj.usace.army.mil/pd/envdocs/envdocsb.htm; and

http://www.saj.usace.army.mil/pd/envdocs/JaxHbr/car.html.

120. Investigations during the 1998 feasibility study covered ocean and beach disposal and the existing conditions on the upland sites. Two sites 9A and 9B were removed from consideration after a comparison of ocean disposal costs (clam shell or hopper dredging) with development of the site as an upland disposal area for hydraulic dredging indicated ocean disposal was less expensive.

121. For plan C alternatives involving expansion of Bartram Island and/or use of potential upland sites 13C, 13D, and 13E mitigation is required for the Bartram Island expansion as outlined in section 4.6 of the EIS. Use of the other upland areas may require mitigation based on impacts to the gopher tortoise, the eastern indigo snake, and potential bald eagle nesting areas. See section 4.4 of EIS. Since expansion of Buck Island by raising the dikes would occur on top of and inside of the existing diked area, no adverse impacts are expected at that site. Use of the beach disposal area would require certain measures to minimize impacts to nesting sea turtles.

122. During the 1998 feasibiltiy study Plan A3 (figures 1 and 6) disposal alternatives for segment 4 involved use of an existing diked upland area on the east end of Bartram Island. Raising of that diked area occurred on top of and inside of the existing dikes so that no adverse impacts would be expected. Ocean disposal for the material from segments 1 and 2 (predominantly rock) will occur at the ODMDS or a nearby artificial reef site (figure 6). No adverse impacts are expected. A final report for Jacksonville Harbor on the "1997 Evaluation of Dredged Material for Ocean Disposal" dated June 2, 1997 in the EIS states that "Aluminum and iron were present in the sediments at much higher concentrations than other heavy metals which were either undetectable or

present at low levels. No cyanide, oil & grease, PCBs, pesticides, PAHs, or doxin were detected in any sediments."

123. For this General Reevaluation Report a HTRW survey of potential upland disposal sites found no signs of potential HTRW contamination. Recent surveys conducted from February 7 –12, 2000, for offshore placement of maintenance material indicated contaminated sediment in the river bottom along the edge of the turn widener connecting Cut-55 to Terminal Channel. Contaminated sediment (PAH's) first appeared in a report dated March 21, 2000, provided by ppb Environmental Laboratories, Inc. for an evaluation of offshore disposal of maintenance material. The Jacksonville Port Authority plans to remove the contaminated sediment with or without a deepening project. An initial meeting occurred on December 17, 2001, with the Jacksonville Port Authority, the Florida Department of Environmental Protection, the Environmental Protection Agency, and Corps representatives to begin evaluation of potential approaches for removal and disposal of the contaminated sediment.

124. For this General Reevaluation Report to determine if potentially significant historic properties are located in the project area, archival research and field investigations have been conducted for the proposed channel improvements and for dredged material disposal areas that may be constructed for this project. Archival research and a remote sensing survey have been conducted for proposed channel realignment and turning basin construction. The report *Submerged Historic Properties Survey, Jacksonville Harbor, Duval County, Florida* was written by Raymond Tubby, Tidewater Atlantic Research, for the Jacksonville District. That report indicates that 10 potentially significant targets exist in the study area. The Chaseville Turn Widener of plan 3A1 (figures 3 and 4) contains one target and the Terminal Channel Turining Basin of plan 3A2 (figures 3 and 5) contains nine targets identified during the remote sensing survey which generated magnetic and/or sonar characteristics that compare favorably with those associated with previously identified submerged historic properties (Tubby 1997). These targets may represent resources eligible for inclusion in the National Register of Historic Places. Consultation with the Florida SHPO (1998)(Project File No. 980852) recommended diver identification and evaluation of any targets that are in project areas. This additional identification and evaluation will occur during the next phase of the project planning. If any of the targets are determined eligible for listing on the National Register of Historic Places mitigation measures will be developed in consultation with the SHPO.

125. For this GRR plans 3A1 and 3A2 do not include construction of new disposal areas. The existing confined upland disposal area (DA/Q1) on the west end of Bartram Island represents the primary site for disposal for material. Impacts resulting from the use Bartram Island for disposal of material from the proposed project are expected to be minimal because of previous disposal activities in that area and the disturbed nature of the site. If for any reason the primary site is not available, secondary sites include artificial reef sites or the existing ODMDS shown on figure 6.

126. The U.S. Geological Survey, Water-Resources Investigations Report 82-4109 in appendix A of the September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement* is an appraisal of the interconnection between the St. Johns River and the Surficial Aquifer in the east-central part of Duval County. The report states that the proposed

dredging of Jacksonville Harbor is not expected to alter significantly the present surface water-ground water relations. It also states that dredging will have no effect on the Floridan aquifer due to a 300 to 450-foot separation between the Floridan aquifer and the Hawthorn Formation. The Hawthorn Formation is described as generally containing beds of low permeability that confine the water confine the water in Floridan aquifer and hydraulically separate it from the surficial aquifer.

127. For the GRR plans 3A1 and 3A2 would extend from mile 14.7 to mile 20. The existing upland confined disposal facility on the west end of Bartram Island would provide sufficient capacity for the disposal of material from both segments 3A1 and 3A2 shown on figure 2. Excavation includes approximately 1,658,000 cubic yards of material. Responses to initial correspondence with Federal, State, and City agencies did not reveal any new environmental considerations to those listed above.

128. Correspondence is included in the Environmental Assessment (EA) or green pages following the main report. Coordination of this EA constitutes consultation with the NMFS under provisions of the Magnuson-Stevens Fishery Conservation and Management Act relative to Essential Fish Habitat (EFH) effects resulting from construction activities associated with the deepening of Cuts 50 – Terminal Channel, Station 65+00 or river miles 14.7 - 20 of the main channel for Jacksonville Harbor. By letters of May 17, 2000 and October 5, 2000 in response to prior scoping letters, NMFS (HCD) has concurred that there is no adverse effect to EFH.

129. Coordination with the U.S. Fish and Wildlife.Service in April 2000 indicates that the November 1997 Coordination Act Report (CAR) adequately addressed the proposed navigation modifications and that a new CAR would not be required.

Environmental Commitments (EIS paragraph 4.34)

130. In their 23 July 1997 Fish and Wildlife Coordination Act Report (Appendix C) the FWS listed several Reasonable and Prudent Measures to protect listed species. The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including those measures in the contract specifications. Except for whales and sea turtles, there are no listed species under the jurisdiction of the NMFS that would be affected by the project. If a hopper dredge is used, its operation would be subject to the requirements of the Regional Biological Opinion concerning these species (revision dated September 25, 1997) from the NMFS. Low-pressure sodium (LPS) lighting was recommended but not required as stated in correspondence form the FWS dated February 17 and March 10, 1998 (See Appendix C). The requirements of a Water Quality Certification from the State would be applied to the project.

Ecosystem Restoration Using Dredged Material (EP-1165-2-1).

131. Ecosystem Restoration Using Dredged Material (EP-1165-2-1). Feasibility studies for new navigation projects or modifications to existing navigation projects shall include an examination of the feasibility of using dredged material for ecosystem restoration. Ecosystem restoration measures included in specifically authorized navigation projects do not rely on the authority of Section 204 of WRDA 1992 and do not count against the annual appropriation limits of Section 204. Funding for

implementation of these measures would be requested as part of the specific Construction, General (CG) funding for the new navigation project or improvement following authorization.

132. A recently approved Section 1135 Preliminary Restoration Plan for Mill Cove, a section of the St. Johns River adjacent to the project area (figure 2), recommends restoration of about 60 acres of salt marsh. The preliminary restoration plan (PRP) would involve dredging shoaled areas of historically deeper water within the Mill Cove area and placing the dredged material south of Bartram Island. The bottom surface would be raised to an elevation that supports salt marsh growth similar to the successful salt marsh mitigation along the east Mill Cove diversion feature. The existing confined disposal facilities on the east and west ends of Bartram Island could also provide material and are under consideration as alternative sources of material in the current Ecosystem Restoration Report (ERR). While use of dredged material from the proposed project deepening received consideration, shoal material from within the Mill Cove area provides a more economical and environmentally acceptable measure. As result of approval of the PRP, the Ecosystem Restoration Report will continue to further evaluate the proposed alternatives suggested by the PRP.

Beneficial Uses of Dredge Material

133. Beneficial uses of dredge material received consideration including recycling of the dredge material for use as construction fill, beach renourishment, and manufactured soil. The material that exists in the proposed deepening area of Cuts 50 through Terminal Channel Station 65+00 consists of a combination of silts, sands, clays, and limestone as described in engineering appendix A. While the potential dredge material contains too much silt for beach placement or construction fill, Dr. Charles R. Lee of the Environmental Laboratory, U.S. Army Engineering Research and Development Center, Waterways Experiment Station tested samples of similar material from the Bartram Island confined disposal facility for use in a manufactured soil. He suggested the dredged material might function as part of a mixture for nursery potting soil after combining it with other organic materials from the Jacksonville area. Subsequent screening tests indicate a high salinity level, which would require additional leaching for use as a manufactured soil. The additional costs for removal, processing, and leaching of the salt from the dredged material have not proved economically feasible to attracted the interest of any private soil manufacturing operations as of yet.

INITIAL FIRST COST OF CONSTRUCTION

134. The engineering analysis on the described alternative plans considered all available information in determining the design conditions for estimating costs. The MCACES estimate in appendix A contains a detail breakdown of initial first costs. For plans 3A1 and 3A2, figure 2, placement of dredged material involves use of the confined upland disposal area (D/A-Q1) on the west end of Bartram Island.

Construction Costs

135. The estimate assumes construction of Cuts 50 – Terminal Channel, Station 65+00, occurs with a 30-inch hydraulic cutter suction dredge. The hydraulic dredge incorporates a cutterhead capable of dredging soft rock. The computed construction

dredging unit cost include additional cost for cutter teeth replacement based on the percentages of rock per Cut.

136. The Jacksonville Port Authority raised dikes an additional 10 feet on the west end of Bartram Island in August 1999 to increase capacity by 6.5 million cubic yards. Raising of those dikes included the necessary weirs to control the return water overflow to insure water quality standards are maintained on the project. Table 9 provides a summary of the first costs for plans 3A1 and 3A2 and references the MCACES estimate found in Appendix A, which contains a detail breakdown of those costs.

137. The proposed project alternatives include the widener, the turning basin, and deepening the channel Segments 3A1 and 3A2 from 38 feet to 39 and 40 feet. The plan formulation process assesses the economic justification of these components on an incremental basis. The widener and turning basin are separable components from the deepening the channel as a first increment; that is, they both can be constructed at the current channel depth of 38 feet. However, the widener and turning basin would have to be deepened commensurate with the deepening alternatives (39 and 40 feet). Moreover, deepening Segment 3A2 to 39 feet, for example, requires that Segment 3A1 be deepened to 39 feet to accrue transportation savings benefits. The incremental first costs and cumulative incremental first costs for the project increments, which total 8, are displayed in Table 9.

138. Table 9 lists each potential navigation feature or project increment group in the most probable sequence of construction for an incremental analysis by depth starting with consideration of the Chaseville Turn widener at a 38-foot project depth. The next increment or segment for evaluation would include the adjacent main channel segment 3A1 to project depths of 39 and 40 feet. The Terminal Channel Turning Basin at project depths of 38 to 40 feet follows. Combinations of each of those increments continue until the maximum possible 40-foot project depth for each combination receives consideration.

139. As part of the construction costs for dredging project depth quantities of 39 and 40 feet the costs in table 9 include quantities for advance maintenance depths of an additional 2 feet required plus 2 feet of allowable overdepth. The additional advance maintenance depths replace the current advance maintenance template for those segments which also includes 2 feet of required plus 2 feet of allowable overdepth. The MCACES estimate also includes berthing area costs for those terminals providing benefits.

Table 9

Jacksonville Harbor First Costs
Reference: MCACES Cost Estimate 11/13/01

Jacksonville Harbor Incremental First Costs (Project Depth + 2' Required; 2' Allowable)

Project	Project Increment	Incremental First Costs	Cumulative Incremental First Costs
38 Foot Project	1. Create Widener at 38 Feet	$1,964,600	$1,964,600
	2. Create Turning Basin at 38 Feet	$2,697,600	$4,662,200
39 Foot Project	3. Deepen 3A1 Channel and Widener from Current Depth to 39 Feet	$3,159,700	$7,821,900
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$5,573,400	$13,395,300
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$325,300	$13,720,600
40 Foot Project	6. Deepen 3A1 Channel and Widener from 39 to 40 Feet	$2,233,900	$15,954,500
	8. Deepen 3A2 Channel from 39 to 40 Feet	$3,032,000	$18,986,500
	10. Deepen Turning Basin from 39 to 40 Feet	$219,800	$19,206,300

Non-construction Costs

140. Non-construction costs shown in the MCACES estimate include real estate administrative costs for re-certification of the existing Jacksonville Port Authority (JPA) upland confined disposal facility at Bartram Island. Preconstruction, engineering, and design costs and construction management costs are also included.

Associated Costs

141. Associated costs include the dredging of the berthing areas of benefiting terminals and modifications to support facilities such as container handling cranes. With the exception of Chevron USA Terminal the bulkhead structures of the other terminals providing benefits require no modifications to accommodate a channel project depth of 40 feet as confirmed by the terminal owners/operators of the U.S. Navy Fuel Depot, ST Services, and the JPA Talleyrand Terminal. Table 18 includes bulkhead modification costs of $850,000 for the Chevron USA Terminal. No modifications are required to the dockside cranes that service the container ships providing benefits at the JPA Talleyrand Terminal. The 3,700 TEU container ships are currently calling at the Talleyrand Terminal using the existing Panamax-size gantry cranes to discharge cargo. These cranes are efficiently handling the cargo requirements of these vessels now, and are expected to do so for projected future cargo traffic.

MAINTENANCE

142. The existing Federal project for Jacksonville Harbor incorporates maintenance dredging almost every year. Completion of the Jacksonville Harbor project to a project depth of 38 feet occurred in 1979. An estimate of the maintenance dredging based on historical data over a 45 year period (1953-1997) for river miles 0-22 is about 670,000 cubic yards on the average each year.[14] The material removed from the channel during maintenance is mostly sand to about mile 11. From that point the material becomes a mixture of sand and silt to about mile 17 where it becomes mostly silt to mile 20.

143. In consideration of the new navigation features for plans 3A1 and 3A2, which widen the existing channel at two different locations, an increase in maintenance will probably result in the area of the proposed Chaseville Turn Widener and the Terminal Channel Turning Basin. Discussions with Construction-Operations and engineering personnel familiar with past dredging operations in those areas indicate approximately half of the proposed new construction areas would likely shoal to a depth requiring maintenance dredging once every three years. Estimated dredging costs for removal of that material are shown in tables 10 and 11 and included every three years over the 50-year economic life of the project. A present worth value is calculated and then annualized over the 50-year economic life at an interest rate of 6.125 percent. The resulting average annual equivalent maintenance costs are shown as $104,000 for the Chaseville Turn Widener and $450,000 for the Terminal Channel Turning Basin.

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[14] CEWES-CE-TS, MEMORANDUM FOR RECORD, Subject: St. Johns River Dredging Requirements Study Letter Report, 6 January 1998, P.8.

JACKSONVILLE HARBOR GRR - INCREMENTAL AAEQ O&M COSTS FOR CHASEVILLE TURN WIDENER - TABLE 10 12/20/01

Project Economic Life:
50 Years

Current Rate: 6.125%
-0.25%: 5.875%
+0.25%: 6.375%

Average Annual Equivalent (AAEQ) or Capital Recovery Factor(S):

6.125%	----->	0.064554
5.875%	----->	0.062340
6.375%	----->	0.066789

ASSUMPTIONS:
- Initial Construction completed by April 2004.
- Mob/Demob included in main channel O&M
- Dredging required once every three years based on past main channel maintenance intervals
- Turn Widener shoaling quantities 56,569 cy

Total Present Valuation(s), Excluding Base Period:

6.125%	----->	$1,608,766
5.875%	----->	$1,669,010
6.375%	----->	$1,551,970

Average Annual Equivalent Valuations:

6.125%	----->	$103,852
5.875%	----->	$104,046
6.375%	----->	$103,654

Year	Period	Applied Discount Factors 6.125%	5.875%	6.375%	Stream Values	Est. O&M Costs for Chaseville Turn Widener 6.125%	5.875%	6.375%
2004	0	1.00000	1.00000	1.00000		$0	$0	$0
2005	1	0.94229	0.94451	0.94007		$0	$0	$0
2006	2	0.88790	0.89210	0.88373		$0	$0	$0
2007	3	0.83666	0.84260	0.83077	$333,299	$278,857	$280,837	$276,895
2008	4	0.78837	0.79584	0.78098		$0	$0	$0
2009	5	0.74287	0.75168	0.73418		$0	$0	$0
2010	6	0.69999	0.70997	0.69018	$333,299	$233,307	$236,632	$230,036
2011	7	0.65959	0.67057	0.64882		$0	$0	$0
2012	8	0.62152	0.63336	0.60993		$0	$0	$0
2013	9	0.58565	0.59822	0.57338	$333,299	$195,198	$199,385	$191,108
2014	10	0.55185	0.56502	0.53902		$0	$0	$0
2015	11	0.52000	0.53367	0.50672		$0	$0	$0
2016	12	0.48999	0.50406	0.47635	$333,299	$163,313	$168,001	$158,767
2017	13	0.46171	0.47609	0.44780		$0	$0	$0
2018	14	0.43506	0.44967	0.42096		$0	$0	$0
2019	15	0.40995	0.42472	0.39574	$333,299	$136,637	$141,557	$131,899
2020	16	0.38629	0.40115	0.37202		$0	$0	$0
2021	17	0.36400	0.37889	0.34973		$0	$0	$0
2022	18	0.34299	0.35786	0.32877	$333,299	$114,318	$119,276	$109,578
2023	19	0.32319	0.33801	0.30906		$0	$0	$0
2024	20	0.30454	0.31925	0.29054		$0	$0	$0
2025	21	0.28696	0.30154	0.27313	$333,299	$95,645	$100,501	$91,034
2026	22	0.27040	0.28480	0.25676		$0	$0	$0
2027	23	0.25480	0.26900	0.24137		$0	$0	$0
2028	24	0.24009	0.25407	0.22691	$333,299	$80,022	$84,682	$75,628
2029	25	0.22623	0.23997	0.21331		$0	$0	$0
2030	26	0.21318	0.22666	0.20053		$0	$0	$0
2031	27	0.20087	0.21408	0.18851	$333,299	$66,951	$71,353	$62,830
2032	28	0.18928	0.20220	0.17721		$0	$0	$0
2033	29	0.17836	0.19098	0.16659		$0	$0	$0
2034	30	0.16806	0.18038	0.15661	$333,299	$56,015	$60,122	$52,197
2035	31	0.15836	0.17037	0.14722		$0	$0	$0
2036	32	0.14922	0.16092	0.13840		$0	$0	$0
2037	33	0.14061	0.15199	0.13011	$333,299	$46,865	$50,658	$43,364
2038	34	0.13249	0.14356	0.12231		$0	$0	$0
2039	35	0.12485	0.13559	0.11498		$0	$0	$0
2040	36	0.11764	0.12807	0.10809	$333,299	$39,210	$42,685	$36,025
2041	37	0.11085	0.12096	0.10161		$0	$0	$0
2042	38	0.10445	0.11425	0.09552		$0	$0	$0
2043	39	0.09843	0.10791	0.08980	$333,299	$32,805	$35,966	$29,929
2044	40	0.09275	0.10192	0.08441		$0	$0	$0
2045	41	0.08739	0.09627	0.07936		$0	$0	$0
2046	42	0.08235	0.09092	0.07460	$333,299	$27,447	$30,305	$24,864
2047	43	0.07760	0.08588	0.07013		$0	$0	$0
2048	44	0.07312	0.08111	0.06593		$0	$0	$0
2049	45	0.06890	0.07661	0.06198	$333,299	$22,963	$25,535	$20,656
2050	46	0.06492	0.07236	0.05826		$0	$0	$0
2051	47	0.06117	0.06835	0.05477		$0	$0	$0
2052	48	0.05764	0.06455	0.05149	$333,299	$19,213	$21,515	$17,161
2053	49	0.05432	0.06097	0.04840		$0	$0	$0
2054	50	0.05118	0.05759	0.04550		$0	$0	$0

JACKSONVILLE HARBOR GRR - INCREMENTAL AAEQ O&M COSTS FOR TC TURNING BASIN - TABLE 11 12/20/01

Project Economic Life:
50 Years

Current Rate: 6.125%
-0.25%: 5.875%
+0.25%: 6.375%

ASSUMPTIONS:
- Initial Construction completed by April 2004.
- Mob/Demob included in main channel O&M
- Dredging required once every three years based on past main channel maintenance intervals
- Turning Basin shoaling quantities = 176,480 cy

Average Annual Equivalent (AAEQ) or Capital Recovery Factor(S):

6.125%	----->	0.064554
5.875%	----->	0.062340
6.375%	----->	0.066789

Total Present Valuation(s), Excluding Base Period:

6.125%	----->	$6,967,564
5.875%	----->	$7,228,484
6.375%	----->	$6,721,583

Average Annual Equivalent Valuations:

6.125%	----->	$449,784
5.875%	----->	$450,624
6.375%	----->	$448,928

Year	Period	Applied Discount Factors 6.125%	5.875%	6.375%	Stream Values	Est. O&M Costs for TC Turning Basin 6.125%	5.875%	6.375%
2004	0	1.00000	1.00000	1.00000		$0	$0	$0
2005	1	0.94229	0.94451	0.94007		$0	$0	$0
2006	2	0.88790	0.89210	0.88373		$0	$0	$0
2007	3	0.83666	0.84260	0.83077	$1,443,518	$1,207,728	$1,216,303	$1,199,233
2008	4	0.78837	0.79584	0.78098		$0	$0	$0
2009	5	0.74287	0.75168	0.73418		$0	$0	$0
2010	6	0.69999	0.70997	0.69018	$1,443,518	$1,010,453	$1,024,853	$996,288
2011	7	0.65959	0.67057	0.64882		$0	$0	$0
2012	8	0.62152	0.63336	0.60993		$0	$0	$0
2013	9	0.58565	0.59822	0.57338	$1,443,518	$845,401	$863,538	$827,687
2014	10	0.55185	0.56502	0.53902		$0	$0	$0
2015	11	0.52000	0.53367	0.50672		$0	$0	$0
2016	12	0.48999	0.50406	0.47635	$1,443,518	$707,310	$727,614	$687,618
2017	13	0.46171	0.47609	0.44780		$0	$0	$0
2018	14	0.43506	0.44967	0.42096		$0	$0	$0
2019	15	0.40995	0.42472	0.39574	$1,443,518	$591,775	$613,085	$571,253
2020	16	0.38629	0.40115	0.37202		$0	$0	$0
2021	17	0.36400	0.37889	0.34973		$0	$0	$0
2022	18	0.34299	0.35786	0.32877	$1,443,518	$495,112	$516,584	$474,580
2023	19	0.32319	0.33801	0.30906		$0	$0	$0
2024	20	0.30454	0.31925	0.29054		$0	$0	$0
2025	21	0.28696	0.30154	0.27313	$1,443,518	$414,238	$435,272	$394,268
2026	22	0.27040	0.28480	0.25676		$0	$0	$0
2027	23	0.25480	0.26900	0.24137		$0	$0	$0
2028	24	0.24009	0.25407	0.22691	$1,443,518	$346,575	$366,758	$327,546
2029	25	0.22623	0.23997	0.21331		$0	$0	$0
2030	26	0.21318	0.22666	0.20053		$0	$0	$0
2031	27	0.20087	0.21408	0.18851	$1,443,518	$289,964	$309,029	$272,116
2032	28	0.18928	0.20220	0.17721		$0	$0	$0
2033	29	0.17836	0.19098	0.16659		$0	$0	$0
2034	30	0.16806	0.18038	0.15661	$1,443,518	$242,600	$260,387	$226,066
2035	31	0.15836	0.17037	0.14722		$0	$0	$0
2036	32	0.14922	0.16092	0.13840		$0	$0	$0
2037	33	0.14061	0.15199	0.13011	$1,443,518	$202,973	$219,401	$187,809
2038	34	0.13249	0.14356	0.12231		$0	$0	$0
2039	35	0.12485	0.13559	0.11498		$0	$0	$0
2040	36	0.11764	0.12807	0.10809	$1,443,518	$169,818	$184,867	$156,026
2041	37	0.11085	0.12096	0.10161		$0	$0	$0
2042	38	0.10445	0.11425	0.09552		$0	$0	$0
2043	39	0.09843	0.10791	0.08980	$1,443,518	$142,080	$155,768	$129,622
2044	40	0.09275	0.10192	0.08441		$0	$0	$0
2045	41	0.08739	0.09627	0.07936		$0	$0	$0
2046	42	0.08235	0.09092	0.07460	$1,443,518	$118,872	$131,250	$107,686
2047	43	0.07760	0.08588	0.07013		$0	$0	$0
2048	44	0.07312	0.08111	0.06593		$0	$0	$0
2049	45	0.06890	0.07661	0.06198	$1,443,518	$99,455	$110,591	$89,463
2050	46	0.06492	0.07236	0.05826		$0	$0	$0
2051	47	0.06117	0.06835	0.05477		$0	$0	$0
2052	48	0.05764	0.06455	0.05149	$1,443,518	$83,209	$93,183	$74,323
2053	49	0.05432	0.06097	0.04840		$0	$0	$0
2054	50	0.05118	0.05759	0.04550		$0	$0	$0

Table 12

Jacksonville Haror AAEQ First Costs
Interest Rate = 6 1/8%
CRF = 0.064554

Jacksonville Harbor Incremental AAEQ First Costs (Project Depth + 2' Required; 2' Allowable)

38 Foot Project	1. Create Widener at 38 Feet	$126,800	$126,800
	2. Create Turning Basin at 38 Feet	$174,100	$300,900
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$204,000	$504,900
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$359,800	$864,700
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$21,000	$885,700
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$144,200	$1,029,900
	7. Deepen 3A2 Channel from 39 to 40 Feet	$195,700	$1,225,600
	8. Deepen Turning Basin from 39 to 40 Feet	$14,200	$1,239,800

Table 13

Jacksonville Harbor AAEQ O&M
Interest Rate = 6 1/8%

Jacksonville Harbor Incremental AAEQ O&M Costs (2' Required; 2' Allowable)

Project	Project Increment	Incremental AAEQ O&M	Cumulative Incremental AAEQ O&M
38 Foot Project	1. Create Widener at 38 Feet	$103,900	$103,900
	2. Create Turning Basin at 38 Feet	$449,800	$553,700
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$0	$553,700
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$0	$553,700
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$0	$553,700
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$0	$553,700
	7. Deepen 3A2 Channel from 39 to 40 Feet	$0	$553,700
	8. Deepen Turning Basin from 39 to 40 Feet	$0	$553,700

Table 13-A

Jacksonville Harbor Incremental AAEQ Dike-Raising
Interest Rate = 6 1/8%

Jacksonville Harbor Incremental AAEQ Dike-Raising Costs (2' Required; 2' Allowable)

Project	Project Increment	Incremental AAEQ Dike-Raising	Cumulative Incremental AAEQ Dike-Raising
38 Foot Project	1. Create Widener at 38 Feet	$1,900	$1,900
	2. Create Turning Basin at 38 Feet	$0	$1,900
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$3,600	$5,500
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$3,000	$8,500
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$0	$8,500
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$2,600	$11,100
	7. Deepen 3A2 Channel from 39 to 40 Feet	$2,100	$13,200
	8. Deepen Turning Basin from 39 to 40 Feet	$0	$13,200

Table 14

Jacksonville Harbor AAEQ IDC
Interest Rate = 6 1/8%

Jacksonville Harbor Incremental AAEQ IDC Costs (2' Required; 2' Allowable)

Project	Project Increment	Incremental AAEQ IDC	Cumulative Incremental AAEQ IDC
38 Foot Project	1. Create Widener at 38 Feet	$600	$600
	2. Create Turning Basin at 38 Feet	$2,600	$3,200
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$4,700	$7,900
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$12,300	$20,200
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$100	$20,300
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$7,600	$27,900
	7. Deepen 3A2 Channel from 39 to 40 Feet	$11,700	$39,600
	8. Deepen Turning Basin from 39 to 40 Feet	$100	$39,700

Table 15

Jacksonville Harbor AAEQ First Costs, O&M, and IDC
Interest Rate = 6 1/8%

Jacksonville Harbor Incremental AAEQ First Costs, AAEQ O&M Costs, and AAEQ IDC (2' Required; 2' Allowable)

Project	Project Increment	Incremental AAEQ First Costs, O&M, and IDC	Cumulative Incremental AAEQ First Costs, O&M, and IDC
38 Foot Project	1. Create Widener at 38 Feet	$233,200	$233,200
	2. Create Turning Basin at 38 Feet	$626,700	$859,900
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$212,400	$1,072,300
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$375,300	$1,447,600
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$21,100	$1,468,700
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$154,500	$1,623,200
	7. Deepen 3A2 Channel from 39 to 40 Feet	$209,700	$1,832,900
	8. Deepen Turning Basin from 39 to 40 Feet	$14,300	$1,847,200

144. Advance maintenance dredging quantities included in the cost estimate allow for a 2-foot required plus a 2-foot allowable overdepth. The additional advance maintenance depths replace the equivalent and existing advance maintenance depths of 2 feet required and 2 feet allowable for that segment of the main channel.

ADVANCE MAINTENANCE

145. Under Jacksonville Harbor's current advance maintenance plan for segment 3A1 and 3A2 or Cuts 50 – Terminal Channel, Station 65+00, an additional 2 feet of required depth plus 2 feet of allowable overdepth is added to the existing 38-foot project depth. That plan received approval in 1997[15]. The September 1998 *Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report and Environmental Impact Statement* modified river miles 0 – 14.7 or Bar Cut to Cut 49 of that plan while leaving Cuts 50 – Terminal Channel the same (38-foot project depth + 2 required + 2 allowable).

146. For the GRR Cuts 50 to Terminal Channel, Station 65+00 will include a 40-foot project depth plus two feet of required depth and 2 feet of allowable overdepth (40-foot project depth + 2 required + 2 allowable). Both the existing and planned channels have equivalent advance maintenance dredging templates. The cost estimate includes project depth quantities of 40 feet plus advance maintenance quantities for the two feet required plus two feet of allowable overdepth for a total dredging depth of 44 feet over the entire channel bottom width from Cuts 50 to Terminal Channel, Station 65+00. Since the existing advance maintenance dredging template is replaced with an equivalent one, no additional advance maintenance costs are anticipated.

AVERAGE ANNUAL EQUIVALENT COSTS

147. The average annual equivalent costs (AAEQ) shown in table 12 -15 are normally figured on construction and increased maintenance of each alternative segment and depth. The AAEQ costs include, the construction or first cost (table 12), increased maintenance for addition of the Chaseville Turn Widener (table 13), the increased maintenance cost for Terminal Channel Turning Basin (table 13), interest during construction (table 14), and a summary of total AAEQ costs (table 15), which is the interest and amortization on the total economic investment for each alternative depth along Cuts 50 to Terminal Channel, Station 65+00, over the economic life of the project. Interest and amortization of first cost including interest during construction and increased maintenance is at a 6 1/8 percent over a project life of 50 years.

BENEFIT ANALYSIS

148. The alternatives are for deepening Cuts 50 through Terminal Channel, Station 65+00 or river miles 14.7 to mile 20 of the existing project channel for Jacksonville Harbor. That reach is identified in the discussions of ALTERNATIVE PLAN

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[15] CESAD-ET-CO-M (CESAJ-CO-OM/17 Oct 97)(11-2-240a)1st End Mr. John P. DeVeaux/dsm/(404 331-6742, Subject: Revised Request for Advance Maintenance Dredging , Barcut 3 through Terminal Channel, Station 64+56, Jacksonville Harbor, Florida.

Table 16

Jacksonville Harbor AAEQ Benefits
Interest Rate = 6 1/8%

Jacksonville Harbor Incremental AAEQ Benefits

Project	Project Increment	Incremental AAEQ Benefits	Cumulative Incremental AAEQ Benefits
38 Foot Project	1. Create Widener at 38 Feet	$451,100	$451,100
	2. Create Turning Basin at 38 Feet	$0	$451,100
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$497,300	$948,400
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$540,700	$1,489,100
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$0	$1,489,100
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$187,900	$1,677,000
	7. Deepen 3A2 Channel from 39 to 40 Feet	$301,200	$1,978,200
	8. Deepen Turning Basin from 39 to 40 Feet	$0	$1,978,200

CONSIDERATIONS and labeled segment 3A (3A1 + 3A2) on the main river channel (figure 2). For segments 3A1 and 3A2 the existing deep draft commercial terminals are shown on figure 2. Benefits for segment 3A1 primarily occur at two petroleum terminals. Terminals providing the primary benefits for segment 3A2 include one petroleum terminal and the JPA Talleyrand Docks and Terminal. The benefit analysis looks at the transportation costs of moving existing and prospective cargo on the river with the existing depths compared to deeper depths. The analysis evaluates those cargo movements over Cuts 50 – through Terminal Channel, Station 65+00 or river miles 14.7 to mile 20. The following analysis involves the benefits associated with each segment under consideration. All benefits are in average annual equivalent (AAEQ) values based on 6 1/8 percent (Fiscal Year 2002 Federal discount rate) over a project life of 50 years. Table 16 provides a summary of the AAEQ benefits by increment at project depths of 38, 39, and 40 feet.

BACKGROUND

149. In July 1998, the District received a letter from ST Services requesting a reanalysis of transportation savings benefits due to changed conditions. ST Services owns and operates a marine petroleum product facility located in Segment 3A. In December 1995, it purchased the facility from Steuart Petroleum Company, which had purchased the adjacent Shell Oil facility in 1991. Since ST Services purchased the facility annual petroleum product receipts have increased from 5 million barrels to 20 million barrels, and deeper-drafting tankers are calling. The significant growth is due to ST Service's expansion of business to achieve a more efficient use of the terminal's capacity, which was previously underutilized. The economic analysis in the feasibility report was based on information received from Steuart Petroleum Company. The analysis reflects cargo and vessel traffic data through 1993. This information resulted in minor tidal delay elimination benefits. Based on more recent data provided by ST Services, the Districted determined that a reanalysis of transportation savings benefits was warranted. However, the District also determined that there was insufficient time to complete an appropriate reevaluation of navigation improvements in Segment 3A in time for incorporation of any improvements into the WRDA 1999. Accordingly, the District decided that it would pursue a post authorization change if the reanalysis determined that navigation improvements were economically justified. Moreover, the US Navy Fuel Depot and US Gypsum are located in Segment 3A. The reanalysis will also include a reevaluation of benefits for those facilities.

150. In a letter dated December 12, 2000, the JPA requested the District assess potential containerized cargo benefits at its Talleyrand Terminal due to deeper drafting container ships that will begin calling in 2001. The District determined that it would be appropriate to reassess all cargo traffic at the Talleyrand Terminal to account for all changed conditions at the facility.

PURPOSE AND SCOPE

151. The purpose of this analysis is to estimate the transportation savings benefits that would accrue to deep-draft vessels calling in Segment 3A, which runs from about river mile 14.7 north of the U.S. Navy Fuel Depot to about river mile 20 at the

Jacksonville Port Authority's (JPA) Talleyrand Terminal. For the analysis Segment 3A is divided into two sub-segments: 3A1 and 3A2. Sub-segment 3A1 consists, in order of river mile, U.S. Navy Fuel Depot, US Gypsum, ST Services, and PCS Phosphate. Sub-segment 3A2 includes Coastal Fuels Marketing/ITAPCO (share terminal facility), Chevron, and JPA Talleyrand Terminal. The Jacksonville Electric Authority's J. Dillion Kennedy Generation Station is located in Sub-segment 3A2. It does have a terminal for the receipt of an occasional receipt of fuel oil. The benefits will be estimated for cargo traffic at these terminal facilities as a result of the proposed harbor improvements, and then compared to the estimated project cost to determine if the improvements are economically justified, and as such, form the basis for a Federal interest in the deep-draft navigation improvements.

152. The scope of the analysis is limited to estimating benefits for a 39-foot and a 40-foot navigation channel depth as the non-Federal sponsor, the Jacksonville Port Authority, has advised that it does not wish to participate in channel improvements beyond 40 feet due to increased cost sharing requirements of the most recent WRDA 1999 deepening authorization. As a result, the entrance channel and main channel that precedes the current study area has an authorized project depth of 40 feet, which limits further evaluation of greater depths upstream.

METHODOLOGY

153. National Economic Development (NED) benefits were assessed following the methodology for deep draft commercial navigation analysis described in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, and other relevant Corps of Engineers analyses and policy guidance.

154. Benefits equal the difference between transportation costs without and with a project. All costs are adjusted to the base year of the project, 2005, and are then converted to Average Annual Equivalent (AAEQ) values using the Fiscal Year (FY) 2002 Federal discount rate of 6 1/8%, assuming a 50-year project life. The Federal interest rate used in the September 1998 Feasibility Report was 7 1/8%. The current interest rate is 6 1/8% (FY 2002). As stated above, AAEQ benefits and costs for this analysis are estimated using the current interest rate. Moreover, AAEQ benefits are estimated using interest rates of 5 7/8% and 6 3/8% to account for potential annual adjustments in the Federal interest rate. All costs are at October 2001 price levels.

155. When compared to project costs, project benefits provide the basis for the selection the NED project plan. Only NED benefits are summarized in the economics appendix. Benefit and cost comparisons are evaluated in the Main Report.

156. Two types of benefit categories are considered in the economic analysis: (1) transportation savings benefits that result from vessels being able to carry more cargo and not wait for the tide; and (2) delay reduction or time savings benefits due to increased vessel maneuverability and removal of transit time restrictions. The first category applies to deepening the channel, while the second category applies to the widener and the turning basin.

Benefits Resulting from Deepening the Channel

157. A detailed description of the methodology used for estimating benefits resulting from deepening the channel is provided for ST Services in the economics appendix. This methodology applies to deepening benefits at all facilities. Only key assumptions and parameters are identified for the other facilities if they differ from those utilized for ST Services, along with summary benefit tables. The estimated NED average annual equivalent (AAEQ) benefits and project costs are compared for a 39-foot, 40-foot and 41-foot project depths to determine if the improvements are economically justified and to identify the project depth at which NED net benefits are maximized.

Benefits Resulting from Constructing the Turn Widener and the Turning Basin

158. Benefits for the widener and the turning basin are the operational and delay time differences between the without- and with-project conditions. The time estimates are based on discussions with the port pilots.

ECONOMIC SUMMARY

159. The estimated benefits and costs for several alternative plans provide the means to make an economic analysis. Table 17 has the average annual equivalent (AAEQ) costs and benefits for the segments 3A1 and 3A2 at 38, 39, 40-foot project depths. Costs and benefits receive an evaluation at October 2001 price levels and interest rates with 6 1/8 percent for discounting.

160. As shown in table 17, the greatest net benefits occur at a 40-foot project depth. At the 40-foot project depth for the combination of the Chaseville Turn widener with main channel segments 3A1, and 3A2 produce the greatest positive net benefits. At the optimized depth of 40 feet the AAEQ benefits and costs are $1,978,000 and $1,184,000 which provide net benefits of $794,000. The benefit to cost ratio is 1.7.

161. The economic summary section compares a combination of different plans. As indicated in table 17 the most economical combination of navigation features or segments maximizes at the 40-foot project depth for the Chaseville Turn widener with main channel segments 3A1, and 3A2. For that project depth the combination of the Chaseville Turn widener with main channel segments 3A1 plus 3A2 met the economic criteria for selection and appear to be the least environmentally damaging as compared to the other combination of plans which involve additional segments.

NED PLAN

162. The Federal objective of water resources planning is to contribute to national economic development consistent with protection of the nation's environment. As

Table 17

Jacksonville Harbor Net AAEQ Benefits Widener as First Increment (2' Required; 2' Allowable)

Project	Project Increment	Incremental AAEQ Costs	Incremental AAEQ Benefits	Incremental Net AAEQ Benefits	Applicable AAEQ Costs	Applicable AAEQ Benefits	Applicable AAEQ Net Benefits	Cumulative AAEQ Costs	Cumulative AAEQ Benefits	Cumulative Net AAEQ Benefits	Cumulative Benefit/Cost Ratio
38 Foot Project	1. Create Widener at 38 Feet	$ 233,200	$ 451,100	$ 217,900	$233,200	$451,100	$217,900	$233,200	$451,100	$217,900	1.93
	2. Create Turning Basin at 38 Feet	$ 626,500	$ -	($626,500)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
39 Foot Project	3. Deepen Widener and 3A1 Channel from 38 Feet or Current Depth to 39 Feet	$ 212,300	$ 497,300	$285,000	$212,300	$497,300	$285,000	$445,500	$948,400	$502,900	2.13
	4. Deepen 3A2 Channel from Current Depth to 39 Feet	$ 375,100	$ 540,700	$165,600	$375,100	$540,700	$165,600	$820,600	$1,489,100	$668,500	1.81
	5. Deepen Turning Basin from 38 Feet to 39 Feet	$ 21,100	$ -	($21,100)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
40 Foot Project	6. Deepen Widener and 3A1 Channel from 39 to 40 Feet	$ 154,400	$ 187,900	$33,500	$154,400	$187,900	$33,500	$975,000	$1,677,000	$702,000	1.72
	7. Deepen 3A2 Channel from 39 to 40 Feet (NED Plan)	**$ 209,500**	**$ 301,200**	**$91,700**	**$209,500**	**$301,200**	**$91,700**	**$1,184,500**	**$1,978,200**	**$793,700**	**1.67**
	8. Deepen Turning Basin from 39 to 40 Feet	$ 14,300	$ -	($14,300)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

shown in table 17 the combination of segments 3A1 and 3A2 at a 40-foot project depth maximizes net national economic development benefits of $794,000 (AAEQ) and is recommended as the national economic development (NED) plan. For the purpose of this study that combination of the Chaseville Turn widener with main channel segments 3A1 and 3A2 at 40 feet (figure 7), provides the best plan of improvements including:

- Segment 3A1 of the main channel at a 40-foot project depth with a 2-foot required and 2-foot allowable overdepth throughout the existing channel width from about mile 14.7 to mile 18.0 or Cuts 50 – 54;

- A 100 to 200-foot widener along the east side of the Chaseville Turn between miles 17 and 18 (figures 7 and 8);

- Segment 3A2 of the main channel at a 40-foot project depth depth with a 2-foot required and 2-foot allowable overdepth throughout the existing channel width from about miles 18 to 20 or Cut 55 through Terminal Channel Station 65+00;

- The 2-foot required and 2-foot allowable overdepths for segments 3A1 and 3A2 replace the equivalent advance maintenance overdepths of 2 feet require and 2 feet allowable for the existing 38-foot project in that area of the main channel;

- All dredged material from the Chaseville Turn widener, main channel segments 3A1, and 3A2 will go in the upland confined disposal facility (DA/Q1) on the west end of Bartram Island (figure 7).

RECOMMENDED PLAN

163. The recommended plan for navigation improvements at Jacksonville Harbor has to be responsive to local needs and desires as well as the economic and environmental criteria established by Federal and State law. To do this the plan must be able to handle current and forecasted vessel traffic safely with minimum impact on the environment and without excessive delays and damage. Subsequent paragraphs outline the plan design, construction, operation and maintenance procedures as well as summarize the economic and environmental effects. For more detailed information on design refer to appendix A. Refer to the benefit analysis section for a summary of the economic analysis and on environmental matters refer to the Environmental Assessment (EA).

DESIGN VESSELS

164. A description of the design vessels for the simulation of Jacksonville Harbor alternative plans exists in the Waterways Experiment Station (WES) ***Ship Navigation Simulation Study, Jacksonville Harbor, St. Johns River, Florida***, Volume 1: Main Text and Appendix A. That report is in the supplemental report section of the ***Navigation Study for Jacksonville Harbor, Duval County, Florida – 04810 Final Feasibility Report an Environmental Impact Statement*** dated September 1998. Design ships for existing conditions were a 950-foot by 106-foot container ship and a 750-foot by 106-foot tanker/bulk carrier. Design vessels for the proposed plans A, B,

and C included a 984-foot by 122-foot container ship and an 850-foot by 106-foot tanker/bulk carrier. For simulation purposes the tankers always traveled inbound and the container ships outbound. The existing condition tanker for ebb tide draft was restricted to 32 feet. For the existing condition tanker with flood tide and the container ship for both tidal conditions the draft was set at 36 feet. With the proposed channel plans the inbound tanker with ebb tide was set to draft 36 and 40 feet with flood tide. The design container ship for the proposed channel was always set to draft 40 feet.

CHANNEL DESIGN

165. As discussed in the engineering appendix A, this reevaluation resulted in modifications to the existing channel depth and width. Plate A-2 of appendix A shows that the existing channel alignment and width was maintained from Cut 50 – Terminal Channel Station 65+00 except for the addition of a widener along the east side of Cuts 51 – 53.

166. The project depth increased from an existing depth of 38 feet to a new depth of 40 feet over the entire length of the study area. The 40-foot project depth also includes an additional 2-foot required and 2-foot allowable overdepth, which results in calculation of total estimated quantities to a depth of 44 feet. The required and allowable overdepths replace the same existing advance maintenance template for Cut 50 – Terminal Channel Station 65+00.

167. The channel design includes a 100 to 200-foot widener along the east side of Cuts 51 – 53 or the Chaseville Turn as shown in Plate A-2. Plate A-3 provides a cross section of the widener. The widener received testing in the ship simulation of the September 1998 feasibility study. As shown the correspondence appendix C, the St. Johns Bar Pilots confirmed in their June 14, 2001, letter that the widener will enhance navigation and does satisfy their concerns relating to deeper-draft vessels transiting the Chaseville Turn.

168. The channel design involves mainly a determination of depth and bottom width dimensions. In evaluating depth, wave conditions as well as vessel drafts, squat, sinkage, and bottom clearance consist of factors in the analysis. Conditions in the study area are not conducive to a lot of wave action so related allowances for clearances are not a design feature. In selecting a channel depth the economic analysis considered the vessel's loaded draft as well as existing and prospective operating practices for bottom clearance. As mentioned earlier in the BENEFIT ANALYSIS section of this study, the average minimum under-keel clearance actually used in Jacksonville Harbor is 2.7 feet for dry and liquid bulk carriers.

169. In determining a channel bottom width, waterway traffic, vessel size, and area conditions are major considerations. The existing and design vessels for the ship simulation mentioned above are representative of current and future traffic for Jacksonville Harbor. To test the channel plans the ship simulator used maximum spring ebb and flood tides. The operation scenarios, design vessels, and environmental conditions recommended provided the "maximum credible adverse situation," or the worst conditions under which the harbor would maintain normal operations. The simulation tested a variety of meeting and passing situations for all the

channels with two-way traffic. Study of two-way traffic was accomplished with two real-time piloted simulations conducted simultaneously.

REAL ESTATE LAND CERTIFICATION

170. The recommended plan will not require any new lands as indicated in real estate appendix B. The administrative costs shown allow for certification of the upland confined disposal facility on the west end of Bartram Island as property that Jacksonville Port Authority still owns.

RELOCATIONS

171. No existing utilities will require relocation as a result of the proposed recommended plan. Section E of the engineering appendix A identifies the existing submarine utilities that cross segment 3A. Plate A-2 identifies Jacksonville Electric Authority (JEA) power cables at an elevation of –48 Local Mean Low Water (LMLW) and an 8-inch sludge force main at –51 feet that cross the Federal channel. Further research and correspondence with utility companies did not reveal any known submarine crossing of local or long distance telephone, cable television, or drinking water lines in the study area.

NAVIGATION AIDS

172. The United States Coast Guard (USCG) has the responsibility to provide and maintain the proper number of navigation aids needed for day and night navigation on a Federal project. As noted in their 31 Oct 01 letter in EA appendix C, the USCG states that after review of the proposed plans, 3A1 and 3A2, that other than the relocation of several buoys no other aid-to-navigation changes appear necessary. No additional USCG aid-to-navigation costs resulted from their review. As a result, no costs are included for any changes to the navigation aids for the new channel modifications.

CONSTRUCTION

173. The recommended plan 3A (3A1 + 3A2), as shown on plate A-2, at a 40-foot project depth consists of maintaining the existing channel alignment and bottom width from Cuts 50 – Terminal Channel Station 65+00 except for the widener added at the Chaseville Turn or Cuts 51 - 53.

174. The 40-foot project, plate A-2 of engineering appendix A, consists of removing material from Cuts 50 – Terminal Channel Station 65+00 to a required depth of 42 feet with a 2-foot allowable overdepth. The additional 2 feet required plus 2 feet of allowable overdepth replaces the existing advance maintenance template for the 38-foot project. The confined upland disposal area (DA/Q1) disposal area on the west end of Bartram Island will receive all material from Cuts 50 – Terminal Channel Station 65+00.

175. Based on design, cost, and environmental considerations no blasting is required. For Cuts 50 – Terminal Channel Station 65+00 of the main channel or river miles 14.7 to 20 excavation is estimated using a rock cutter-head dredge which will pump the

material to the existing upland disposal area (DA/Q1) at the West End of Bartram Island.

176. The 40-foot project depth consists of a 2-foot required and a 2-foot allowable overdepth or a 44-foot depth for estimated quantities. The MCACES estimate in Appendix A, table A-1, includes a quantity estimate of 1,658,000 cubic yards for the recommended plan (Segment 3A1 + the Chaseville Turn Widener + Segment 3A2 without the Terminal Channel Turning Basin). Berthing area quantities for the 40-foot project depth of the recommended plan include those terminals providing benefits. The MCACES estimate in appendix A, table A-1, list those berthing area quantities. Berthing areas quantities for the ST Services consist of an estimated 5,000 cubic yards of material. The U.S. Navy Fuel Depot berthing area includes approximately 43,000 cubic yards of material; 39,000 cubic yards for Chevron Oil Terminal; and 38,000 cubic yards for JPA Talleyrand berthing areas. Computation of the above quantities made use of the most recent after-dredge surveys (Survey Numbers 00-250, 00-273, 00-277, and 01-021).

177. Total new work dredging quantities total approximately 1,658,000 cubic yards. In the dredging process the contractor does not shape the side slopes. The anticipated 1(Vertical) on 3(Horizontal) side slopes form naturally with most of the material moving into the channel cut during construction. The estimated construction time totals about 10.4 months including one month for mobilization and demobilization.

178. For estimating purposes the construction process includes a 30-inch hydraulic cutter suction dredge capable of dredging soft rock. The dredge will pump directly to the upland confined disposal facility located on the west end of Bartram Island. The geotechnical investigations section of engineering appendix A indicates that convention dredging equipment can achieve all of the required dredging without the aid of blasting.

179. Environmental monitoring during project construction requires several activities. Installation of warning signs for manatee protection in the construction area precedes dredging activities. Monitoring of the dredging activities occurs daily to maintain turbidity levels within State standards. Disposal of material from the main channel will be in the permitted West Blount Island upland confined disposal facility (DA/Q1).

180. Engineering Appendix plate A-2 shows two different utility lines crossing under the Federal channel at the south end of Cut-55 near the beginning of Terminal Channel. The Jacksonville Electric Authority (JEA) transmission cables have a top of pipe elevation of –48 feet and the Jacksonville Department of Public Utilities sludge force main has a top of pipe elevation of –51 feet. As noted on plate A-2 the proposed deepening would not cause a conflict with either utility. CECW-EP Memorandum, dated 30 August 1995, Subject: Standard Engineering Guidance for Setting Pipeline and Cable cover Requirements in Navigable Waters and Navigation Channels, provides guidance for setting pipeline and cable cover requirements. This memorandum states the following: “The minimum bottom cover for pipelines and cables shall be measured from the maximum depth of dredging. This depth is generally the authorized project depth, plus any over depth for advanced maintenance and the allowable dredging tolerance. The absolute minimum bottom cover for pipelines and cables shall be 48 inches in soil or 24 inches in compacted rock as established by the Office of Pipeline Safety (OPS), Department of Transportation and published in 49 CFR S 192.327 and

49 CFR S195.248. The District practice requires 6 feet (which includes allowances for advance maintenance and allowable overdepths) of cover in soil below the authorized project depth of the navigation channel. The JEA submarine transmission line at a depth of –48 feet meets or exceeds both the District (project depth of -40 feet + (-6) feet of cover in soil = -46feet) and OPS requirements (-44 feet maximum dredging depth + (-4) feet of cover in soil = -48feet) for pipeline and cable cover and as a result does not require relocation. Plans and specifications will indicate that extreme caution is to be exercised when dredging near the utility crossing.

FIRST COSTS

181. The estimated first cost of the NED plan for Cuts 50 – Terminal Channel Station 65:00 is in table 18. All costs are based on October 2001 price levels. Engineering, design, and construction management costs are an estimate based on actual experience for similar type projects. There is no known removal or relocation work required for construction. All lands needed for the project are within the navigable water of the United States. No real estate costs are evident for the project other than the administrative costs identified. The berthing area costs as shown in Table 18 are a 100% sponsor's responsibility. Sponsor berthing area costs for deepening to the same project depth of 40 feet and the resulting bulkhead modifications are included for each segment.

182. An existing upland disposal area on the West End of Bartram Island provides the required capacity. The Jacksonville Port Authority (JPA) recently raised the dikes on that disposal facility 10 feet to an elevation of 28.5 feet in August 1999. That improvement provided an additional 6.5 million cubic yards of capacity for the upland confined disposal facility on the west end of Bartram Island. The 1,658,000 cubic yards of dredged material from the proposed new work represents about 26 percent of the new capacity (1,658,000/6,500,000). A District audit of the Jacksonville Port Authority costs for design and construction of the Bartram Island dike raising project identified total costs of $2,588,672.55.[16] While JPA has already paid for their portion of those costs, 26 percent of the $2,588,672.55 or $673,000 has been applied at the appropriate time in the future when the addition of the 1,658,000 cubic yards of dredged material would require the dikes to be raised again. The present worth of that future cost was obtained and then annualized over the 50 year economic life of the project to obtain an annualized cost of $13,200. That annual cost is included as an economic cost in table 19 and 20, but not as a financial cost for cost sharing purposes in table 23 since JPA has paid those costs.

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[16] December 20, 2000, CESAJ-CT (715)MEMORANDUM FOR Deputy District Engineer for Project Management, Attn: Jerry Scarborough, Subject: Review of Costs for the Bartram Island Dike Raising Project, Request for Reimbursement No. 2 Submitted by Jacksonville Port Authority IAW Agreement Under Section 204(e), As Amended, of Public Law 99-662, dated 25 January 1999.

Table 18 - Jacksonville Harbor GRR - Chaseville Turn Widener + 3A1 + 3A2 Main Channel Dredging					
03 = 40-foot Project Depth					
Reference: Brian Blake MCACES estimate dated 09/26/02					
Turning Basin (03 - A/12.02.99/03) Removed					
Toyota Berthing Area (03 - A/12.0299/05) Removed					
Chevron USA bulkhead costs added					**6/30/2002**
				15%	
		Quantity		Contin-	Total
		CY	Contract	gency	Cost
03	40-foot Project Depth				
03- A	Construction Cost				
03 - A/12	Navigation Ports & Harbors				
03 - A/12.02	Harbors				
03 - A/12.02.01	Mobil, Demobil & Prep Work				
03 - A/12.02.01/01	Dredging, Mobil & Demobil		780,183	117,027	897,210
	Total Mobil, Demobil & Prep Work		780,183	117,027	897,210
03 - A/12.02.16	Pipeline Dredging - Segment 3A1				
03 - A/12.02.16/01	Excavation & Disposal, Cut-50	320,986	1,701,226	255,184	1,956,410
03 - A/12.02.16/02	Excavation & Disposal, Cut-51	126,919	728,515	109,277	837,792
03 - A/12.02.16/03	Excavation & Disposal, Cut-52	59,066	333,723	50,058	383,781
03 - A/12.02.16/04	Excavation & Disposal, Cut-53	89,333	366,265	54,940	421,205
03 - A/12.02.16/05	Excavation & Disposal, Cut-54	83,932	517,021	77,553	594,574
03 - A/12.02.16/06	New Cut-51/52 Widener	290,951	820,482	123,072	943,554
03 - A/12.02.16/07	US Navy Fuel Depot Berth	43,090	247,337	37,101	284,438
03 - A/12.02.16/08	ST Services Berthing Area	5,119	27,131	4,070	31,201
	Total Pipeline Dredging - Segment 3A1	1,019,396	4,741,700	711,255	5,452,955
03 - A/12.02.99	Pipeline Dredging - Segment 3A2				
03 - A/12.02.99/01	Excavation & Disposal, Cut-55	256,294	2,352,779	352,917	2,705,696
03 - A/12.02.99/02	Excavation & Disposal, Cut TC	305,236	2,771,543	415,731	3,187,274
03 - A/12.02.99/03	New Terminal Channel Turning Basin		0	0	0
03 - A/12.02.99/04	Talleyrand Terminal Port Berths	37,963	344,704	51,706	396,410
03 - A/12.02.99/05	Talleyrand Terminal Toyota Berths		0	0	0
03 - A/12.02.99/06	Chevron Oil Terminal Berth	39,445	358,161	53,724	411,885
	Chevron Bulkhead Modifications		0	0	850,000
	Total Pipeline Dredging - Segment 3A2	638,938	5,827,187	874,078	7,551,265
	Total Harbors	1,658,334	11,349,070	1,702,361	13,901,431
	Total Navigation Ports & Harbors		11,349,070	1,702,361	13,901,431
	Total Construction Costs		11,349,070	1,702,361	13,901,431
03 - B	Non-Construction Cost				
03 - B/01	Lands and Damages		14,000	3,500	17,500
03 - B/30	Planning, Engineering & Design 10%		1,135,000	0	1,135,000
03 - B/31	Construction Management (S&I) 8%		908,000	0	908,000
	Total Non-Construction Costs		2,057,000	3,500	2,060,500
	Total 40-foot Project Depth		**13,406,070**	**1,705,861**	**15,961,931**
	Revised Total 40-foot Project Depth				15,961,931
	Interest During Construction				571,600
	Economic Investment				16,533,531
	Annual Costs				
	AAEQ of Economic Investment				1,067,305
	AAEQ of O&M Chaseville Turn Widener				103,852
	AAEQ Bartram Island Dike Raising in 20 years (26% x $2,588,672.55)				13,200
	Total AAEQ				1,184,357

183. Interest during construction (IDC) in table 18 for the widener, 3A1 channel, and 3A2 channel or the recommended plan is based on Preconstruction, Engineering and Design (PED) taking place at a uniform rate of expenditure and starting at the beginning of construction. IDC also includes a phasing of construction components. Following Corps guidance, IDC is computed on a monthly basis using the current Federal interest rate. IDC is not included for the Bartram Island Dike raising costs mentioned above since construction has already occurred.

FUTURE OPERATIONS AND MAINTENANCE

184. At this time further deepening and widening using recommended plan 3A (3A1 + 3A2) is estimated to increase the shoaling in the harbor by approximately 57,000 cubic yards every three years as a result of the addition of the Chaseville Turn Widener. Increased maintenance costs for removal of that shoal material amount to an estimated Average Annual Equivalent (AAEQ) cost of $103,852 as shown in tables 10 and 13. The cost estimate includes advanced maintenance dredging for segment 3A or Cuts 50 – Terminal Channel Station 65+00. The advance maintenance dredging quantities included in the cost estimate allow for a 2-foot required plus a 2-foot allowable overdepth. The additional advance maintenance depths of 2 feet required and 2 feet allowable replace the existing advance maintenance depths of 2 feet required and 2 feet allowable for that segment of the main channel. As previously discussed in paragraph 182 an AAEQ cost of $13,200 is included for future Bartram Island dike raising costs. That annual cost is included as an economic cost in table 19 and 20, but not as a financial cost for cost sharing purposes in table 23 since JPA has paid those costs.

185. The USCG will handle future maintenance required on navigation aids and the Port Authority must provide for maintenance of berthing areas. Maintenance of the general navigation features for commercial navigation, including the Chaseville Turn widener, is a 100% Federal responsibility.

ANNUAL COSTS

186. The estimated annual costs for the recommended plan are in table 19. The annual costs consists of only the increased annual Operations and Maintenance (O&M) for the added Chaseville Turn Widener since there is no expected increase in the annual maintenance costs for USCG navigation aids for the recommended plan over the existing project costs. Interest and amortization of $1,067,000 at 6 1/8 percent over the economic life of 50 years is shown to pay back the economic investment cost of $16,554,000 in table 18.

Table 19

ANNUAL COSTS OF RECOMMENDED PLAN

Item	Annual Amount
Economic Investment	$1,067,000
Future Bartram Island Dike Raising	$ 13,000
Maintenance:	
Navigation Aids (USCG)	$ 0
O&M Chaseville Turn Widener	$ 104,000
TOTAL ANNUAL COSTS	$1,184,000

ENVIRONMENTAL EFFECTS

187. The Recommended Plan would have the potential of injuring manatees by boat collisions and propeller lacerations during project construction activities. This adverse potential would be neutralized by the manatee protection measures that would be required by any Federal contract let for this project. Turbidity monitoring will be required to maintain State water quality standards. See Environmental Assessment (EA) for more details (the green pages following this section of the report). The environmental quality (EQ) account displays non-monetary effects on significant natural and cultural resources. Table 1 of the September 1998 feasibility study final EIS contains the EQ account. A copy of the September 1998 EIS is available on our web site at http://www.saj.usace.army.mil/pd/envdocs/envdocsb.htm. The District web site contains a copy of the July 1997 U.S. Fish and Wildlife Service Coordination Act Report (CAR) at http://www.saj.usace.army.mil/pd/envdocs/JaxHbr/car.html.

188. Florida Fish and Wildlife Conservation Commission in their March 9, 2000, letter expressed concerns over potential collisions of commercial vessel traffic with North Atlantic right whales since the offshore area is located within an important calving and nursery are for that imperiled species. Concerning potential collisions of commercial vessels, the economic analysis used primarily the existing fleet of vessels currently transiting Jacksonville Harbor. Transportation savings to those vessels will occur with deepening of the existing harbor, which allows the existing fleet to load deeper. As larger ships are introduced those large vessels replace the existing fleet so the actual number of vessels does not increase over time. The vessel calls or transits through Jacksonville over time will decrease as a result of the proposed deepening.

189. Environmental Commitments identified in paragraph 4.34 ENVIRONMENTAL COMMITMENTS of the September 1998 EIS that apply include the following.
In their 23 July 1997 Fish and Wildlife Coordination Act Report (Appendix C) the FWS listed several Reasonable and Prudent Measures to protect listed species. The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including those measures in the

contract specifications. Except for whales and sea turtles, there are no listed species under the jurisdiction of the NMFS that would be affected by the project. If a hopper dredge is used, its operation would be subject to the requirements of the Regional Biological Opinion concerning these species (revision dated September 25, 1997) from the NMFS. Low-pressure sodium (LPS) lighting was recommended but not required as stated in correspondence form the FWS dated February 17 and March 10, 1998 (See Appendix C of the September 1998 EIS). The requirements of a Water Quality Certification from the State would be applied to the project.

BENEFITS

190. A detailed evaluation of benefits to be derived from implementation of the recommended plan are in table D-22 of the economics appendix D *(FOR OFFICIAL USE ONLY)*. Benefits result from transportation costs savings due to reductions in costs associated with the reduction or elimination of tidal delays and light loading. To obtain average annual equivalent values all future values of projected benefits are discounted at an interest rate of 6 1/8 percent over a period of 50 years. The total average annual equivalent (AAEQ) benefits for the recommended plan are $1,995,000. A summary of those benefits is in table 20.

Table 20

(AAEQ) BENEFITS AND COSTS FOR THE NED RECOMMENDED PLAN

Channel Segment	Commodity	40-foot Project
Chaseville Turn Widener	All	$503,000
3A1	Liquid Bulk	$634,000
3A2	Liquid Bulk – Petroleum	$67,000
3A2	Liquid Bulk – Chemical	$1,000
3A2	Containerized	$772,000
3A2	General Cargo	$1,000
Total Benefits		$1,978,000
Benefits During Construct'n		$17,000
Total Benefits + BDC		$1,995,000
Total Costs		$1,184,000
Net Benefits		$811,000
Benefit/Cost		1.68

ECONOMIC SUMMARY

191. On the recommended plan (NED Plan) the benefits exceed the cost by $811,000 annually ($1,995,000 - $1,184,000). The benefit to cost ratio is equal to the total average annual equivalent benefit of $1,995,000 divided by the total average annual equivalent cost of $1,184,000. That ratio is 1.7 to 1.0 as shown in table 20.

FLOOD PLAIN ASSESSMENT

192. Executive Order 11988 requires the Federal Government to avoid, if possible, adverse impacts associated with the occupancy and modification of flood plains as well as direct or indirect support of development in those areas where there is a practical alternative. The existing port facilities at Jacksonville Harbor are already in the 100 year flood plain. Federal improvement of the existing navigation project will encourage continued use of existing facilities on those lands as well as those already planned for future growth in commerce. Port development will occur with or without the proposed improvement.

193. Relocation of cargo facilities such as the gantry cranes, piers, bulkheads, and paved storage areas for containers is not practical for a port serving deep draft ships. The port facilities are about at the 100 year elevation to avoid any serious damages from flooding. Use of alternative Florida ports is impractical as most are in similar flood plain situations. In addition, maintenance dredging activities will cause no flood plain or wetland impacts and consequently no gains or losses of acreages realized in the flood plain or coastal zone. Therefore, the proposed plan is in compliance with the Executive Order calling for enumeration of those possible impacts.

SEA LEVEL RISE

194. Throughout geologic history, global sea level variations, both rise and fall, have occurred. Some authorities have found evidence to indicate that we may be entering a new ice age with a resultant sea level drop. Others argue that increasing atmospheric concentrations of carbon dioxide and other gases are causing the earth to warm, contributing to a sea level rise. Eustatic sea level change is defined as a global change of the oceanic water level. Total relative sea level change is the sum of the eustatic sea level and any local change in land elevation.

195. The National Ocean Service (NOS) has compiled relatively long-term (approximately 50-year duration) records of measured water surface elevations at various locations along United States coastlines. The station closest to the project areas is located at Mayport, Florida. Florida was estimated to be 2.2 millimeters per year (mm/yr). The corresponding estimate of sea level rise, in English units, is about

0.0072 feet per year (ft/yr). Therefore, over the 50-year life of the project, sea level rise is estimate to be 0.36 feet.

DREDGED MATERIAL MANAGEMENT PLAN

196. Placement of the approximately 1,658,000 cubic yards of new work material for the Recommended Plan will occur at the upland confined disposal facility on the west end of Bartram Island. The Jacksonville Port Authority recently raised the dikes on that disposal facility 10 feet to an elevation of 28.5 feet in August 1999. That improvement provided an additional 6.5 million cubic yards of capacity for the upland confined disposal facility on the west end of Bartram Island. As of December 2001 no major dredging event has required use of that disposal area.

197. "The St. Johns River Dredging Requirements Study Letter Report", dated 6 January 1998, estimates 670,000 cubic yards as the average yearly maintenance dredging quantity for Jacksonville Harbor. The study estimates the 670,000 cubic yards per year occur between river miles 0 and 22 of the main channel. Under the existing maintenance approach, material from mile 0 through mile 6.56 is normally disposed of on the Beach. From mile 6.6 through mile 15 the material is designated to either Buck Island or the west end of Bartram Island depending on the quality of the material. From mile 15 through mile 22 the west end of Bartram Island is designated as the disposal area.

198. Based on that designation of shoal material from the Federal channel to specific disposal areas Bartram Island would probably receive about 213,000 CY/YR (7/22 x 670,000 CY/YR). Using that figure Bartram Island would have capacity for about 30 years (6,500,000 CY of capacity / 213,000 CY/YR = 30.5 years) before another required dike raising. Since Bartram Island could infrequently also receive unknown quantities of material not suitable for construction fill or beach placement from river miles 6.6 through 15, for planning purposes, 20 years is used as the anticipated time for the next future dike raising. Based on the designation of the Federal channel to specific combined disposal areas, Buck and Bartram Islands could potentially receive shoal material from river mile 6.6 through mile 20 or about 13.4 miles of the recommended plan. Assuming a uniform deposition rate and ignoring the potential for ocean disposal, those two upland disposal areas could receive about 408,000 CY/YR (13.4/22 x 670,000 CY/YR).

199. The raising of the dikes at Buck Island during 1998 created an additional 1.5 Million CY of disposal capacity for quality material which the Jacksonville Port Authority uses for a continuing source of clean fill material. The Wonderwood Expressway, a major road building program, a short distance from the Buck Island site will require construction fill in the near future. According to the Jacksonville Port Authority potential contractors have already inquired about use of that material. Once construction of the Wonderwood Expressway begins, use of construction fill from Buck Island will result in increased capacity. On the east end of Bartram Island a cross dike recently raised to a height of 45 feet in the confined disposal area will allow potential utilization of that disposal area for maintenance material. Sufficient material now exists in the east end of Bartram Island to allow raising of the existing 25-foot high dikes an additional 20 feet to provide about 1 – 1.5 million cubic yards of additional capacity. Ignoring the potential

increased capacity at Buck Island from the recycling of dredge material for construction fill and the potential use of the east end of Bartram Island (1 –1.5 million cubic yards), current capacity estimates for Buck Island (1.5 million cubic yards) and the west end of Bartram Island (6.5 million cubic yards) total 8.0 million cubic yards.

200. Assuming Buck and the west end of Bartram Islands will receive about 408,000 CY of dredged material per year, Buck and Bartram Islands will have enough future capacity for about 20 years (8,000,000/408,000) based on the above yearly average. That assumption also does not include additional capacity developed in Buck Island as a result of recycling of dredged material for construction fill, the potential use of the east end of Bartram Island or the potential for ocean disposal.

201. The majority of the material from Jacksonville Harbor project is generally suitable for ocean disposal. The Environmental Protection Agency (EPA) designated the Jacksonville Harbor Ocean Dredged Material Disposal Site (ODMDS) with a capacity of 5 million cubic yards per year. Before and after bathymetry of the ODMDS indicates sediment placement does result in mounds, but those mounds do not persist.

202. With an available ocean disposal potential of 5 million cubic yards per year along with approximately 20 years of capacity available in Buck and Bartram Islands, the recommended plan will not impact the Dredge Material Management Plan (DMMP). Therefore, the DMMP does not require revisions as a result of the recommended plan. In addition, a recently approved Section 1135 Preliminary Restoration Plan for Mill Cove, a section of the St. Johns River adjacent to the project area (figure 2), recommends restoration of about 60 acres of salt marsh. The preliminary restoration plan (PRP) would involve dredging shoaled areas of historically deeper water within the Mill Cove area and placing the dredged material south of Bartram Island. The bottom surface would be raised to an elevation that supports salt marsh growth similar to the successful salt marsh mitigation along the east Mill Cove diversion feature of Bartram Island. The existing confined disposal facilities on the east and west ends of Bartram Island are an alternative source of material, which would further increase the above estimated capacity.